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MILITARY HANDBOOK

SATELLITE CONTROL NETWORK

HARDWARE AND SOFTWARE

OPERATIONAL ACCEPTANCE PROCESSES



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DEPARTMENT OF THE AIR FORCE
Washington, D.C. 20360

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Satellite Control Network Hardware and Software Operational
Acceptance Process

1. This military handbook is approved for use within the Department of the Air Force, and is available for use by all Departments and Agencies of the Department of Defense.
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FOREWORD

1. The Air Force Satellite Control Network (AFSCN) is a global, intercommand configuration of telemetry, tracking, control, and communications resources, all operating in concert to support Department of Defense (DoD) and other assigned space vehicles and space missions. The AFSCN consists of dedicated systems, common user elements, and supporting resources. Various government agencies operate and manage dedicated mission unique resources. The Air Force Space Command (AFSPACECOM) has general operational responsibility for the common user elements; the Air Force Systems Command (AFSC) has the sustaining engineering functions until Program Management Responsibility Transfer (PMRT). After PMRT of the system or equipment, the Air Force Logistics Command (AFLC) has management responsibility over AFSCN operational resources.

2. An array of different contractors work with each of these DoD agencies. It is therefore important that all contractors involved recognize what testing must be done and the procedure to follow to attain the operational status of modifications or upgrades in the AFSCN.

3. This document establishes the procedure for the turnover of operations and maintenance to the site and the site technical acceptance of systems, equipment, or software acquired by procuring activities for the AFSCN. The procedure for effecting the transition of new or modified software from development to operational use is included. These processes precede Program Management Responsibility Transfer (PMRT) of the system or equipment per AFR 800-19, Systems or Equipment Turnover.

4. This document is intended for reference or compliance in the contract Statements of Work and in Memoranda of Agreement between DoD agencies. The document identifies the required tasks for effecting the transition of new or modified hardware and software from development to operational use.

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SECTION 1

SCOPE

1.1 PURPOSE.

This document establishes the baseline for the site technical acceptance, and the procedures for turnover to site operations, of ground equipment and associated computer software in the Air Force Satellite Control Network (AFSCN). This includes transitioning modifications or upgrades of the existing resources to operational capability and the transfer of operations and maintenance responsibility from the implementing to the operating agencies. Status codes are established and defined for standardized progress reporting of hardware modifications or installations and the associated documentation. This handbook also contains definitions applicable to the satellite control network.

1.2 APPLICATION

The AFSCN is continually evolving by adding new and improved space vehicle command, control, and communications resources. Modifications and upgrades are constant occurrences in this evolutionary process. The procedures in this document apply to the site technical acceptance, transfer of operation, and transfer of maintenance responsibility of new or modified hardware. The procedures also apply to the integration and operational acceptance of new software modifications and upgrades into the network baseline.

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SECTION 2

REFERENCED DOCUMENTS

NONE

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SECTION 3

DEFINITIONS AND ACRONYMS

3.1 DEFINITIONS

Terms are in accordance with the following definitions:

3.1.1 Acceptance Tests Acceptance tests are the required formal tests conducted to demonstrate acceptability of an item for delivery. The tests are designed to demonstrate performance to specified requirements and to act as quality control screens to detect deficiencies of workmanship, material, and quality.

3.1.2 AFSCN Configuration Control Board The Air Force Satellite Control Network (AFSCN) Configuration Control Board (CCB) is the board which approves and controls all permanent changes to the AFSCN engineering baseline and maintains configuration control of the AFSCN through a decentralized system of AFSCN CCB sub-boards. The AFSCN CCB sub-boards include the common user element CCB that is responsible for the common user elements of the AFSCN, and the various dedicated system CCBs that are responsible for those dedicated systems that interface with the AFSCN and operate in conjunction with the common user elements.

3.1.3 Air Force Common-user-element Data System Library. The Air Force Common-user-element Data System Library (AFCDSL) is a facility designated as the custodian and repository of official Air Force Satellite Control Network computer software products, associated documentation, configuration status accounting data, and certain specified hardware documentation. The AFCDSL provides storage of, and controlled access to, software and documentation in human-readable form, machine-readable form, or both.

3.1.4 Air Force Test Team The Air Force Test Team (AFTT) is a team assigned by the sustaining engineering Procuring Activity to monitor or conduct a test or evaluation.

3.1.5 Commercial Off the Shelf Commercial off the shelf (COTS) is an item (hardware, software, or both) produced and made commercially available or in stock by a vendor prior to the vendor receiving orders or contracts for sale of the item. The vendor may produce the item to either commercial, military, or federal specifications or descriptions. COTS includes items stocked by distributors for which government contracts may be received. Nondevelopmental software is considered as COTS in this document.

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3.1.6 Common User Element The common user element refers to the resources of the Air Force Satellite Control Network which provide primary or backup (or both) command, control, tracking, and telemetry support for both research and operational space vehicles.

3.1.7 Component. A component is a functional unit that is viewed as an entity for purposes of analysis, manufacturing, maintenance, or record keeping. Hardware examples are hydraulic actuators, valves, batteries, electrical harnesses, and individual electronic boxes such as transmitters, receivers, or multiplexer. (See definition of computer software component.)

3.1.8 Computer software Component. A computer software component (CSC) is a functionally or logically distinct part of a computer software configuration item (CSCI) that is distinguished for purposes of convenience in designing and specifying a complex CSCI as an assembly of subordinate elements.

3.1.9 compute Software configuration Item. A computer software configuration item (CSCI) is a configuration item (CI) for computer software. (See definition of configuration item.)

3.1.10 computer Software Unit A computer software unit (CSU) is an element specified in the design of a computer software component (CSC) that is separately testable.

3.1.11 configuration Control Board A board composed of officially designated management representatives which approves or disapproves proposed engineering changes to the current approved configuration identification.

3.1.12 Configuration A configuration item (CI) is hardware or software, or an aggregation of both, that satisfies an end use function and is designated by the Procuring Activity as a CI for configuration management purposes. A CI may be a hardware configuration item (HWCI), a computer software configuration item (CSCI), or a configuration item that is an aggregation of both hardware and software.

3.1.13 contractor Modification. A contractor modification is a hardware or software modification that requires the preparation of a contractor Engineering Change Proposal.

3.1.14 Deficiency Types There are two types of deficiencies used in the Integration Deficiency Reports (IDR), Type 1 and Type 2.

- a. A Type 1 deficiency is a condition, characteristic, or performance that does not meet approved specifications or requirements.

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- b. A Type 2 deficiency is a condition, characteristic, or performance, resulting from an inadequate or erroneous specification or requirement, that does not, or may not, fulfill operational requirements.

Reported conditions that are not deficiencies are proposed enhancements.

3.1.15 Development Contractor. A development contractor is a contractor responsible for the development engineering and modification of configuration items (hardware, software, or both) .

3.1.16 Development Tests Development tests include all tests conducted to obtain information to aid in the design and manufacturing processes. Development tests are conducted to generate design parameters, validate design concepts, verify design criteria, determine design margins, identify failure modes, and to determine manufacturing processes. Development testing may be informal in that controlled design and test documentation, formal certification, formal retest requirements, and flight type hardware are normally not required.

3.1.17 Development Tests and Evaluations Development tests and evaluations (DT&E) are the formal tests conducted to assist the engineering design and development process and to verify attainment of the specified performance requirements and objectives . This may include tests and evaluations of components, subsystems, computer software, prototype models, full-scale engineering development models of the system, integration of related hardware and software, and tests of compatibility and interoperability with existing or planned equipment and systems.

3.1.18 Deviation. A deviation is a written authorization, granted prior to the acquisition, manufacture, or delivery of an item, to depart from a particular performance or design requirement, specification, drawing, or other document for a number of units or for a specific period of time. A deviation is not effective until approved in writing by the procurement contracting officer (PCO).

3.1.19 Engineering Change Proposal A proposed engineering change and the documentation by which the change is described, justified, and submitted to the Procuring Activity for approval or disapproval.

3.1.20 Firmware Firmware is a combination of a hardware device and computer instructions or computer data that reside as read-only software on the hardware device. The software cannot be readily modified under program control.

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3.1.21 Formal Qualification Review. The Formal Qualification Review is the test, inspection, or analytical process by which a group of configuration items (CIS) comprising a system are verified to have met specification requirements.

3.1.22 Formal Qualification Test. A formal qualification test (FQT) is a test process performed to determine whether a configuration item complies with the allocated requirements for that item.

3.1.23 Functions configuration Audit. A functional configuration audit (FCA) is a formal audit to validate that the development of a configuration item has been completed satisfactorily and that the configuration item (CI) achieves the performance and functional characteristics specified in the functional or allocated configuration identification. Operations and support documentation are also reviewed for compliance with requirements.

3.1.24 Hardware configuration Item. A hardware configuration item (HWCI) is a configuration item (CI) for hardware. (See definition of configuration item.)

3.1.25 Implementing Organization. The implementing organization is that component organization of the Procuring Activity designated to implement engineering projects.

3.1.26 Integration Contractor. An integration contractor is a contractor that provides services to assist the Procuring Activity in achieving an operational status for projects by such actions as verifying compliance of the projects with approved plans and specifications in concert with scheduled milestones. An integration contractor is distinct from the development contractor, or is a designated group in a separate and autonomous organization within the development contractor - organization.

3.1.27 Integration Contractor Representative. An integration contractor representative (ICR) is the on-site representative of an integration contractor who monitors and coordinates on-site hardware and software installation efforts and installation schedules to minimize the impact of conflicts on site operations. The ICR is the designated on-site test conductor member of the Air Force Test Team.

3.1.28 Integration Deficiency Report. The Integration Deficiency Report (IDR) is that report completed during the installation, checkout, and integrated system testing phases of an installation or modification which describes and categorizes a deficiency. The IDR is used to track a deficiency, either

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Type 1 or Type 2, until it is resolved by government approved action, such as contractor action correcting the deficiency, conversion to a Service/Deficiency Report (S/DR), or opening an Air Force Technical Order (AFTO) Form 22. Type 1 IDRs are based on contract scope.

3.1.29 Interface Requirements Specification. An Interface Requirements Specification (IRS) is a document that specifies the requirements for one or more interfaces at any system or system segment level, including interfaces between one or more configuration items, computer software configuration items, or other critical items.

3.1.30 Item Levels. The item levels used in this document, from the simplest to the most complex, are:

- a. Part (for hardware only)
- b. Subassembly (for hardware only)
- c. Unit (for software only)
- d. Component
- e. Subsystem
- f. Configuration item
- g. System segment
- h. System

3.1.31 Launch System. A launch system is the composite of equipment, skills, and techniques capable of launching and boosting a space vehicle into orbit. The launch system includes the space vehicle(s), the upper stage(s), the launch vehicle, and related facilities, equipment, material, software, procedures, services, and personnel required for their operation.

3.1.32 Minor Modification. A minor modification is a permanent or temporary engineering change that falls within the limits of the minor modification cost criteria. A minor modification can be implemented by:

- a. A contractor minor modification, identified by a contractor ECP, that falls within the contractual provision of the development contractor's minor modification tasking that can be implemented with reduced reviews and documentation (may be either a permanent or a temporary contractor minor modification), or

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- b. A permanent minor modification, identified by an Air Force Engineering Change Proposal (AFECP), that can be installed and checked out by the site operations and maintenance personnel and uses contractor level-of-effort resources for implementation, or
- co A temporary minor modification, identified by an Temporary Configuration Change (TCC) or Test Case Modification (TCM), that can be installed and checked out by the site operations and maintenance personnel and uses contractor level-of-effort resources for implementation

3.1.33 Mission Ready Status. Mission ready status is the status attained by a new item, modification, or installation (hardware, software, or both) when all required testing has been completed, required engineering, operation, and maintenance documentation have been received by the site, and test results show the item or modification is ready for mission support. Computer software attains this status after formal qualification review and when additionally the operational software configuration has been constructed and is ready for mission support.

3.1.34 Modification. An alteration to a produced material or software item which is applicable to AFSCN ground equipment or computer software. The alteration changes, as a minimum, the fit or function of the item.

3.1.35 Modification control Board. The modification control board (MCB) is a local site or complex control board convened by the on-site representative of the Operating Agency.

3.1.36 Modification Transmittal Notification. The Modification Transmittal Notification (MTN) is a document prepared by the development contractor or development agency which lists the contents of the modification package sent to a site. The MTN identifies short-shipped items and in-plant deficiencies not corrected before shipping. Instructions or test plans as required for installation and checkout may be included in the MTN. The MTN is also used to document the receipt, inspection, and condition, as received, of the modification package contents.

3.1.37 Nondevelopmental Software. Nondevelopmental software (NDS) is deliverable software that is not developed under the contract but is provided by the contractor, the government, or a third party. NDS may be referred to as reusable software, government furnished software, or commercially available software, depending on its source.

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3.1.38 On-orbit System. An on-orbit system is the composite of equipment, skills, and techniques permitting on-orbit operation of the space vehicle. The on-orbit system includes the space vehicle(s), the command and control network, and related facilities, equipment, material, software, procedures, services, and personnel required for their operation.

3.1.39 Operating Agency. The Operating Agency is a generic term which is used to describe any agency primarily responsible for the operational employment of a system or items of equipment. Air Force Space Command is the designated Operating Agency for the Air Force Satellite Control Network (AFSCN). The Consolidated Space Test Center is also an AFSCN Operating Agency.

3.1.40 Operating Agency On-Site Representative. The Operating Agency on-site representative is the designated authority for technical acceptance of on-site modifications or approval for operations. Examples are the Commander for a Remote Tracking Station, the Mission Director or the Squadron Commander for an Air Force Satellite Control Network control complex, and the Directors of other operations support areas as applicable.

3.1.41 Operational Acceptance. Operational acceptance is the official acknowledgment by the Operating Agency on-site representative that the new items, modifications, or installations (hardware, software, or both) has been completed and approved as operational at that site.

3.1.42 Operational Modes. The operational modes for an item include all combinations of operational configurations or conditions that can occur during each operational state. Some examples are: power on or power off, command modes, readout modes, standby, calibration, and antennas stowed or tracking.

3.1.43 Operational States. The operational states for a system or system segment include the major operational configurations or conditions that can occur during their service life. Some examples are: maintenance state, standby state, launch support, on-orbit support, and training.

3.1.44 Operations and Maintenance Responsibility Transfer. The operations and maintenance responsibility transfer (OMRT) is that point at which the Air Force Satellite Control Network (AFSCN) Operating Agency on-site representative formally accepts, for that site, responsibility and accountability for the operations and organizational maintenance of the acquired equipment from the Procuring Activity. (This is also known as Turnover.)

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3.1.45 Operational Tests And Evaluations. Operational tests and evaluations (OT&E) is the process that appraises a system's operational effectiveness and suitability of new items, modifications, or installations (hardware, software, or both) and provides information on tactics, doctrine, organization, and personnel requirements in a realistic operational environment.

- a. Initial operational tests and evaluations (IOT&E) are conducted with the equipment in its operational configuration, in an operational environment, by the operating personnel in order to test and evaluate the effectiveness and suitability of the hardware and software in meeting operational requirements. These tests emphasize reliability, maintainability, supportability, and logistics.
- b. Follow-on operational tests and evaluations (FOT&E) are conducted with the equipment in its operational configuration, in an operational environment, by the operating personnel assigned to refine estimates made during initial operational tests and evaluations (IOT&E) and to identify operational system deficiencies.

3.1.46 Part. A part is a single piece, or two or more pieces joined together, which are not normally subject to disassembly without destruction or impairment of the design use. Some examples are resistors, transistors, integrated circuits, relays, capacitors, gears, screws, and mounting brackets.

3.1.47 Physical configuration Audit. A physical configuration audit (PCA) is a formal examination of the as-built version of a configuration item against its design documentation to establish the product baseline.

3.1.48 Procuring Activity. The Procuring Activity is the Government office or agency with primary responsibility for developing and acquiring the system, subsystem, equipment, computer software, or engineering services addressed in this document.

3.1.49 Requirements Screening Panel The requirements screening panel is a panel for screening and determining the substantiality of a reported Service/Deficiency Report (S&DR).

3.1.50 Reusable software Reusable software is software developed in response to the requirements for one application that can be used, in whole or in part, to satisfy the requirements of another application.

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3.1.51 Satellite Control Network System Program Office.

The Satellite Control Network System Program Office (SCN SPO) is the Air Force Systems Command, Space Systems Division, organization with responsibility for the sustaining engineering acquisitions and configuration management of the Air Force Satellite Control Network (AFSCN) common user elements of the system until Program Management Responsibility Transfer (PMRT). The SCN SPO is the sustaining engineering Procuring Activity for the AFSCN.

3.1.52 Service/Deficiency Report. A Service/Deficiency Report (S/DR) is a report completed to document an operational system deficiency or a proposed system enhancement.

3.1.53 Site. A site is a generic term used to refer to "any operating location, operating complex, operations area, or support area.

3.1.54 Software Development File. The software development file (SDF) is a collection of documentation material pertinent to the development or support of software. Contents typically include (either directly or by reference) design considerations and constraints, design documentation and data, schedule and status information, test requirements, test cases, test procedures, and test results.

3.1.55 Software Maintenance In general, software maintenance refers to a variety of support activities required during the operational life of the computer software configuration items, including the implementation of changes or modifications to meet continuing changes in operational requirements, or to correct inherent design defects or errors. This term also includes the reissuing of software specifications as well as operator and user manuals to reflect implemented changes or modifications. Note that in the context and scope of sustaining engineering, as defined herein, software maintenance includes development and modification. Software maintenance is limited to fixing deficiencies to bring the software into conformance with development and product specifications.

3.1.56 Software Requirements Specification. A software requirements specification (SRS) is a document that specifies the detailed requirements (functional, interface, performance, qualification, etc.) allocated to a particular computer software configuration item.

3.1.57 Software Test Description. A software test description (STD) is a document that identifies the input data, expected output data, and evaluation criteria that comprise the test cases. The STD also contains the necessary procedures to perform the formal testing of a computer software configuration item.

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3.1.58 Software Test Plan A software test plan is a document that describes the formal qualification test plans for one or more computer software configuration items, identifies the software test environment resources required, and provides schedules for the activities. In addition, the software test plan identifies the individual tests that are to be performed.

3.1.59 S o f t w a r e A Software Test Report (STR) is a record of the formal testing performed for a particular computer software configuration item.

3.1.60 Software Transmittal Notice The Software Transmittal Notice (STN) is the document prepared by the development contractor to formally notify the Procuring Activity, or its implementing organization, of a software delivery.

3.1.61 Status Codes Status codes are a means of reporting the progress of site installation, checkout, and deliverable documentation efforts.

3.1.62 Subassembly. The term subassembly denotes two or more parts joined together to form a stockable unit which is capable of disassembly or part replacement. Examples are a printed circuit board with parts mounted, or a gear train.

3.1.63 Subsystem. A subsystem is an assembly of two or more components, including the supporting structure to which they are mounted, and any interconnecting cables or tubing. A subsystem is composed of functionally related components that perform one or more prescribed functions.

3.1.64 Sustaining Engineering. Sustaining engineering (SE) is the term used for the engineering responsibility for systems development, modifications, and software maintenance. This includes the systems engineering functions of investigation, technical evaluation, and recommendations on all proposed changes to baselined specifications for intersegment and intrasegment impacts. This responsibility for design and implementation of system technical requirements and capabilities includes the integration of the development or modification into the existing system or network, as well as the assurance of system integrity and performance (through development testing) and the update of associated documentation. Concurrent with these responsibilities is the authority for configuration control of the Functional, Allocated, and Product Baselines. The following definitions apply when used within the scope of the context of sustaining engineering:

- a. Development Development is the responsibility for implementing new capabilities to meet requirements. For operational systems this

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represents the implementation of changes that impact the system functional requirements. This action requires the integration of the changes into the system as well as the update of the development and product specifications.

- b. Modification Modification is the responsibility for implementing changes to the development and product specifications as defined by the allocated and product baselines. This includes changes to the component design and changes to the interfaces between system components as well as component fixes that require engineering changes. This action requires the integration of changes into the system as well as the update of the affected specifications and engineering data.
- c. Maintenance Engineering Maintenance engineering is the responsibility for maintenance analysis. This includes trend analysis and parts substitution analysis, but does not include the act of repair.
- d. **Software Maintenance.** Software maintenance is the responsibility for implementing computer software fixes. This includes all necessary actions to assure the computer software in the system complies with the existing functional baseline, allocated baseline, and product baseline. This action is limited to fixing programming errors within the software to bring it into conformance with the existing specifications (i.e., no changes to the baselines are required). The changes can only impact program listing and must not impact computer program design. Modification and development represent engineering changes to the software which are outside the scope of software maintenance. (Note that for contractual purposes the term "software maintenance" has often been used to include "modification" and "development" as in the context of sustaining engineering.)

3.1.65 System. A system is the composite of equipment, skills, and techniques capable of performing or supporting an operational role. A system includes all operational equipment, related facilities, material, software, services, and personnel required for its operation. Examples of systems that include space vehicles and ground equipment as major subtier elements are launch systems and on-orbit systems.

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3.1.66 System Segment. A system segment is a major subtier element of a system that is so identified by the responsible program office, either for management expediency or to facilitate separate procurements.

3.1.67 Test Case Modification. A temporary change to an existing baseline equipment on software to be made during a period of operational support to investigate solutions to a reported problem or to gather test data for a design or development effort.

3.1.68 Temporary Configuration Change An authorization to provide a temporary capability to a CI/CSCI in support of a unique mission requirement or a temporary resolution to a safety, maintenance or contractual schedule problem.

3.1.69 Target Site The target site is the operational location slated for a hardware or software modification or installation.

3.1.70 Test Discrepancy A test discrepancy is a functional or structural anomaly that occurs during testing and which indicates a possible deviation from specification requirements for the test item. A test discrepancy may be a momentary, nonrepeatable, or permanent failure to respond in the predicted manner to a specified combination of test environment and functional test stimuli. Test discrepancies may be due to a failure of the test unit or to some other cause, such as the test setup, test instrumentation, supplied power, test procedures, or computer software used.

3.1.71 Turnover. Turnover is that point in time when the operating command formally accepts responsibility and accountability from the implementing command for the operations and organizational maintenance of the system or equipment required. Turnover is also known as Operations Maintenance Responsibility Transfer (OMRT) in the Air Force Satellite Control Network.

3.1.72 Validation. Validation is the evaluation process used to determine compliance with specified requirements.

3.1.73 Validation of Technical Documentation. validation of technical documentation is the process used by the developing contractor to test the technical accuracy and adequacy of the procedural portions of the maintenance documentation for a modification or installation.

3.1.74 Verification. Verification is the evaluation process used to determine the correctness and consistency of items with respect to the products and standards provided as input .

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3.1.75 Verification of Technical Documentation

Verification of technical documentation is the process by which the Operating Agency ensures that technical documentation, such as technical manuals and preventive maintenance instructions, provided for a modification or installation is accurate and adequate for operating and maintaining the equipment involved.

3.1.76 Version Description Document. The Version Description Document (VDD) describes the exact release and version of an individual computer software configuration item or a major software development. The VDD identifies the software units and components involved, all Engineering Change Proposals (ECPs) incorporated, problems, and known errors that are corrected by the ECPs. The VDD also provides installation instructions and other data needed to load, operate, or regenerate the delivered software.

3.1.77 Waiver. A waiver is a written authorization by the Procuring Contracting Officer to do either of the following:

- a. To accept a configuration item or other designated item which, during production or submission for inspection, departs from specified requirements, but is still considered suitable for use in its existing state or after rework using an approved method.
- b. To depart in a designated way from a design code, compliance document, standard, or design criteria, or from portions thereof, during manufacture, assembly, installation or testing of a configuration item or other designated item.

3.2 ACRONYMS

AFCDL	Air Force Common-user-element Data System Library
AFCEP	Air Force Engineering Change Proposal
AFLC	Air Force Logistics Command
AFPRO	Air Force Plant Representative Office
AFR	Air Force Regulation
AFSC	Air Force Systems Command
AFSCN	Air Force Satellite Control Network
AFSPACECOM	Air Force Space Command
AFTO	Air Force Technical Order
AFTT	Air Force Test Team
AWP	Awaiting Parts
CCB	Configuration Control Board
CDRL	Contract Data Requirements List
CI	Configuration Item
COTS	Commercial Off the Shelf

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List of Acronyms (continued)

CSC	Computer Software Component
CSCI	Computer Software Configuration Item
CSU	Computer Software Unit
CUE	Common User Element
DCASPRO	Defense Contract Administration Services Plant Representative Office
DoD	Department of Defense
DT&E	Development Tests and Evaluations
ECP	Engineering Change Proposal
EI/MA	Equipment Installation/Modification Acceptance
FCA	Functional Configuration Audit
FOT&E	Follow-on Operational Tests and Evaluations
FQR	Formal Qualification Review
FQT	Formal Qualification Test
GFE	Government Furnished Equipment
HWC I	Hardware Configuration Item
I CCN	Installation and Checkout Completion Notice
I CR	Integration Contractor Representative
I DR	Integration Deficiency Report
IML	Installation Modification List
IOT&E	Initial Operational Tests and Evaluations
IRS	Interface Requirements Specification
MCB	Modification Control Board
MTAR	Modification Technical Acceptance Recommendation
MTN	Modification Transmittal Notification
NDS	Nondevelopmental Software
O&M	Operations and Maintenance
OMRT	Operations and Maintenance Responsibility Transfer
OT&E	Operational Tests and Evaluations
PCA	Physical Configuration Audit
PCO	Procurement Contracting Officer
PMI	Preventive Maintenance Instruction
PMRT	Program Management Responsibility Transfer
SCN	Satellite Control Network
SDF	Software Development File
S/DR	Service/Deficiency Report
SE	Sustaining Engineering
SICN	Software Integration Completion Notice
SPO	System Program Office
SRS	Software Requirements Specification
SSD	Space Systems Division (Air Force Systems Command)
STD	Software Test Description
STN	Software Transmittal Notice
STR	Software Test Report
TCC	Temporary Configuration Change
TCM	Test Case Modification
TM	Technical Manual
TO	Technical Order
VDD	Version Description Document

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SECTION 4
GENERAL REQUIREMENTS

4.1 TESTING.

The testing process is an integral part of the site technical acceptance and transfer of operation and maintenance responsibility procedure in the Air Force Satellite Control Network (AFSCN). Table 1 depicts the structure of the AFSCN test and evaluation program.

4.2 HARDWARE DELIVERY TO SITE.

Developed hardware or modification kits procured via a development contractor shall be delivered to the target site in a modification package. A modification transmittal notice document shall accompany each delivery. The package shall be inventoried for shortages and damages. Results shall be reported to the development contractor and the implementing organization of the Procuring Activity.

4.3 OPERATION AND MAINTENANCE RESPONSIBILITY TRANSFER

The operation and maintenance responsibility transfer is effected when the installed modification or upgrade is ready to support a mission.

4.4 ACCEPTANCE.

Contractual acceptance of a development contractor site hardware modification or upgrade on site shall include a technical acceptance recommendation from the Operating Agency at the modified or upgraded site. Acceptance for installation of development contractor software modifications or upgrades is determined by the Operating Agency after the software Formal Qualification Review (FQR) has been completed.

4.5 STATUS REPORTING.

The modification implementation process shall include the reporting of hardware modification status at the site to both the development contractor and implementing organization.

4.6 COMPUTER SOFTWARE TRANSITION.

Prior to Program Management Responsibility Transfer (PMRT) there are two major software development transitions and two

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TABLE I. OVERVIEW MATRIX OF SATELLITE CONTROL NETWORK HARDWARE AND SOFTWARE TESTS AND EVALUATIONS

TEST ELEMENTS	TEST STEPS					OPERATIONAL TESTS AND EVALUATIONS *	
	DEVELOPMENT TESTS AND EVALUATIONS						
	PART, MATERIAL, AND SOFTWARE UNIT TESTS	STEP 1 TESTS	STEP 2.1 TESTS	STEP 2.2 TESTS	STEP 3 TESTS	STEP 4 TESTS	STEP 5 TESTS
TEST TITLE	SUBTIER TESTS	COMPONENT TESTS & EVALUATIONS	SINGLE CI COMPLIANCE TESTS	COMBINED CI COMPLIANCE TESTS	INTEGRATED SYSTEM TESTS	INITIAL OPERATIONAL TESTS & EVALUATIONS (10TBE) *	FOLLOW-ON OPERATIONAL TESTS & EVALUATIONS (FOTBE) *
TEST PURPOSE	SUPPORT DESIGN AND DEVELOPMENT	SUPPORT DESIGN AND DEVELOPMENT	DEMONSTRATE HWCI & CSCI CONFORMANCE TO DEVELOPMENT SPECIFICATIONS	DEMONSTRATE PERFORMANCE REQUIREMENTS OF A SYSTEM OR A SYSTEM SEGMENT SPECIFICATION	DEMONSTRATE PERFORMANCE REQUIREMENTS OF THE INTEGRATED SYSTEM	EVALUATE HOW WELL THE OPERATIONAL REQUIREMENTS HAVE BEEN MET	VERIFY THE SYSTEMS CONTINUED ABILITY TO SUPPORT OPERATIONS
TEST MANAGEMENT RESPONSIBILITY	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR OR INTEGRATION CONTR. OR BOTH	OPERATING AGENCY (ASSISTED BY PROCURING ACTIVITY)	OPERATING AGENCY
TEST CONDUCTOR	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR OR INTEGRATION CONTR. OR BOTH	OPERATORS ASSISTED BY AF TEST TEAM	OPERATORS
TEST WITNESS	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	OPERATING AGENCY	OPERATING AGENCY
ITEM LEVEL	PART, MATERIAL, SUBASSEMBLY, OR SOFTWARE UNIT	COMPONENT	HWCI OR CSCI	INTEGRATED CIs	INTEGRATED SYSTEM	INTEGRATED SYSTEM	INTEGRATED SYSTEM
HWCI & CSCI CONFIGURATION	IN TEST CONFIGURATION	IN TEST CONFIGURATION	IN TEST CONFIGURATION	IN SIMULATED SYSTEM CONFIG.	IN SIMULATED OR OPERATIONAL SYS.	OPERATIONAL CONFIGURATION	OPERATIONAL CONFIGURATION
TEST LOCATION	CONTRACTOR FACILITY OR TEST BED	CONTRACTOR FACILITY OR TEST BED	CONTRACTOR FACILITY OR TEST BED	TEST BED OR SITE	OPERATIONAL SITE OR TEST BED	OPERATIONAL SITE	OPERATIONAL SITE
TEST PLAN & PROCEDURE PREPARATION	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	OPERATING AGENCY (ASSISTED BY AF TEST TEAM & INTEGRATION CONTR)	OPERATING AGENCY
TEST PLANS APPROVAL	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	DEVELOPMENT CONTRACTOR	OPERATING AGENCY	OPERATING AGENCY

* See Subsection 6.4

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major audits or reviews for software development or modifications. The first transition occurs between the software development contractor and the Air Force Test Team (AFTT), or designated integration contractor. This transition occurs between Step 2 and Step 3 testing. Developed or modified software is delivered to the Air Force Common-user-element Data System Library (AFCDL) and audited as a software package. This delivered software is then integrated into the satellite control network existing software system and tested at the integrated system level (Step 3). The second major transition is made to the Operating Agency and takes place after successful completion of Step 3 testing. The Formal Qualification Review (FQR) is conducted at this time.

4.7 TEST PLANS AND PROCEDURES

Test plans and procedures shall be tailored to the specific needs of the equipment or associated computer software and the tests shall be combined when practical. Depending upon the characteristics and complexity of the development or modification, individual procedure steps may have additional substeps defined. For simpler developments, the test plans, the test procedures, or both may be consolidated to conserve resources. If two or more development tests are to be conducted in the same test facility or operational area, the advantages of combining the tests into one test plan should be considered. A single test plan is generally best, provided test quality and thoroughness are not compromised.

4.7.1 Test Plans. The test plans shall be based upon a function by function mission analysis and the testing requirements. Test objectives shall be planned to verify compliance with the design and specified requirements of the items involved, including interfaces. To the degree possible, tests shall be planned and executed with the idea of fulfilling test objectives that are both developmental and operational in nature. The test plans shall indicate the test requirements, testing approach for each item, related special test equipment, facilities, system interfaces, and network downtime requirements. The test plans shall identify the allocation of requirements to appropriate testable levels of assembly. A brief background of the project and test item descriptions shall be included in the test plans. For software test plans, where test item descriptions may not be in order, a brief background, which includes the requirements to be fulfilled and a brief description of new capabilities or deficiencies to be corrected, may suffice.

Test tools and test beds shall be identified in the test plan. The test plan shall also state the qualification testing planned for the test tools and test beds to demonstrate to the Procuring Activity that the tools, test beds, or both represent an operational system environment and verify that simulated interfaces are correct.

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When appropriate, the test plan may be drafted using an existing test plan properly modified for the purpose. The use of template test plans for modifications to an existing configuration baseline is encouraged.

4.7.2 Test Procedures Tests shall be conducted using documented test procedures-prepared for performing all of the required tests in accordance with the test objectives in the approved test plans. The test objectives, testing criteria, and pass-fail criteria shall be stated clearly in the test procedures. The test procedures shall cover all operations in enough detail so that there is no doubt as to the execution of any step. Test objectives and criteria shall be stated clearly to relate to design or operations specifications. Where appropriate, pass-fail criteria shall be provided at the procedure step level. Traceability shall be provided from the specifications or requirements to the test procedures. Where possible, the individual procedure step which satisfies the requirement shall be identified. The test procedure for each configuration item (CI) shall include, as a minimum, descriptions of the following:

- a. Initialization requirements
- b. Input data
- c. Expected intermediate test results
- d. Expected output data
- e. Pass-fail criteria for evaluating results
- f. Assumptions and constraints

4.7.3 Software Test Plans and Software Test Description Documents Some acquisition contracts may have requirements for the delivery of a Software Test Plan and a Software Test Description (STD) document for the software development involved. In those cases, the requirements stated in this document for test plans and test procedures that are applicable to the software should be satisfied in the applicable Software Test Plan and STD documents. The STD document shall provide traceability of the requirements in the software requirement specification and interface requirement specification to the test cases that fully or partially satisfy each requirement or set of requirements. For software maintenance, traceability to the deficiency which identified a problem shall be provided in the test procedures or software test description.

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4.8 **RETEST**

Whenever the design of hardware or the coding of computer software is changed, the hardware and computer software involved shall be retested, as necessary, and all documentation pertinent to the changes shall be revised. When retesting a configuration item (CI), limited retesting of the CI may be adequate to verify that the new design is satisfactory and no new problems have been introduced. However, care must be exercised with this limited retesting concept since even small changes can potentially affect the CI in unexpected ways. The degree of retesting requires approval by the Procuring Activity.

Retesting may also be necessary if a discrepancy occurs while performing any of the required test steps. In that case, conducting a proper failure analysis plays an important part in determining the type and degree of retesting. The failure analysis should include the determination of whether a failure occurred, the cause of the failure, the symptoms of the failure, and isolation of the failure to the smallest replaceable item.

4.8.1 During Compliance Testing. If a test discrepancy occurs during compliance testing, the test may be continued without corrective action if the discrepant item or software coding area does not affect the validity of test data obtained by the continuation of testing. Otherwise the test shall be interrupted and the discrepancy verified. If the discrepancy is caused by the test setup, test software, or a failure in the test equipment, the test being conducted at the time of the failure may be continued after the cause is removed and repairs are completed, as long as the failure did not overstress the item under test. If the discrepancy is caused by a failure of the item under test, the preliminary failure analysis and appropriate corrective action shall normally be completed and properly documented before testing is resumed.

The decision to require retesting rests with the government. The Air Force Test Team (AFTT) monitors compliance testing and reviews the result to determine whether retesting, if any, is required of the development contractor. Retesting required by the test director is a basis for determining compliance of a test item to a specification or requirement, and is used to assess the readiness of the test items for integrated systems testing.

4.8.2 During Integrated System Testing. If a discrepancy occurs during integrated system testing, it shall be properly documented for later evaluation. The Air Force Test Team (AFTT) is responsible for assessing the effect of a discrepancy to

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determine whether the discrepancy has jeopardized the probable success of the remainder of the test. The test director decides to continue or halt the test. If continued, the test starts at the test procedure step designated by the test director. The integrated system testing should be continued, where practicable, to conserve time-critical operational resources. When the discrepancy has been corrected or explained, retesting may be required. Depending upon contract provisions, test location, and operational factors, the degree of retesting may require approval by the Procuring Activity or other government agencies.

4.8.3 During Operational Tests and Evaluations. If a discrepancy occurs during operational tests and evaluations, it is documented for later evaluation. The Operating Agency is responsible for assessing the effect of the discrepancy to determine whether the discrepancy has jeopardized the probable success of the remainder of the test. The Operating Agency is also responsible for determining the degree of retesting required.

4.9 DOCUMENTATION

4.9.1 Test Documentation Files. The test procedures, list of test equipment used, computer software used, test data, test results, problems or deficiencies encountered, all pertinent analyses, and resolutions shall be documented and maintained. The test documentation files shall be maintained by the applicable contractors for the duration of their contracts and shall be made available for Procuring Activity review upon request.

4.9.2 Test Data Pertinent test data shall be maintained to permit the evaluation of performance under the various specified test conditions. Transient responses and mode switching tests shall be examined for proper response. The test data shall also be compared across major test sequences for trends or evidence of anomalous behavior. All relevant test measurements and the environmental conditions imposed on the units shall be recorded on electronic media, such as magnetic tape, or by other suitable means to facilitate automated accumulation and sorting of data for the critical test parameters. These records are intended to be an accumulation of trend data and critical test parameters which shall be examined for out of tolerance values and for characteristic signatures. A summary of the test results shall be documented in a test report. The test report shall detail the degree of success in meeting the test objectives of the approved test plans and shall document the test results, deficiencies, problems encountered, and problem resolutions.

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4.9.3 Test Log. Formal test conduct shall be documented in a test log. The test log shall be time-tagged to permit a reconstruction of test events such as start time, stop time, and any periods of interruption. The test log shall be made available for Procuring Activity review upon request.

4.9.4 Documentation Formats Documents, forms, technical manuals, and data are prepared and distributed in accordance with the Contract Data Requirements List (CDRL) of the applicable contract. The formats presented in this handbook are intended as guidance only, unless invoked by the CDRL.

4.10 FIRMWARE.

Firmware that falls under the intent and purpose of a Commercial Off The Shelf item (COTS, see 3.1.5) shall be tested as COTS (see 4.13.4). Firmware that does not fall under the intent and purpose of a COTS item shall be tested as a development item subject to the test and acceptance procedures of this document. The software element of firmware shall be tested and accepted as software, and the hardware element of firmware shall be tested and accepted as hardware.

4.11 PART, MATERIAL, AND SOFTWARE UNIT DEVELOPMENT TESTS AND EVALUATIONS

Part, material, and software unit development tests and evaluations are conducted to demonstrate the feasibility of using certain items in the implementation of a design. These tests may be conducted at in-plant test facilities which may include subcontractor's facilities, at a government approved test bed, or at any other appropriate test facility. However, when performed at an operational government facility, that government facility may require approval of the test plans and procedures. Internal contractor documentation of development test plans, test procedures, and test results are normally used unless stated otherwise by contract.

4.11.1 Part and Material Level Development Tests and Evaluations. The development contractor shall conduct part and material development tests and evaluations, as necessary, to qualify parts, materials, and processes to assure proper application in the design, and to develop acceptance criteria for deliverable items to avoid assembling defective hardware components.

4.11.2 Subassembly Level Development Tests and In-Process Tests and Inspections. The development contractor shall conduct all subassembly development tests and evaluations as may be required to demonstrate feasibility, to minimize design risk,

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and to assess the design and manufacturing alternatives and tradeoffs to best achieve the development objectives. Tests shall be conducted as required to develop in-process manufacturing tests, inspections, and acceptance criteria for the items that assure system design and performance margins, and to avoid assembling defective hardware items.

4.11.3 Computer Software Unit Tests The earliest development tests and evaluations of software are performed on computer software units (CSUs) which are the smallest software element of a computer software component that is separately testable. As a minimum, each CSU shall be tested to ensure that the algorithms and logic employed are correct and that the CSU satisfies its specified requirements. For each CSU or logically related group of CSUs, the test procedures, design code, test results, deficiencies or problems encountered, and resolutions shall be documented in a software development file (SDF) maintained by the development contractor. Whenever the design or coding are changed, the CSU shall be retested, as necessary, and all documentation pertinent to the changes shall be revised and updated.

4.12 STEP 1: COMPONENT TESTS AND EVALUATIONS.

Component tests and evaluations are in-process inspections which are used to develop system design and performance margins and to provide criteria used to avoid assembling defective hardware items. These tests may be conducted at in-plant test facilities which may include subcontractor's facilities, at a government approved test bed, or at any other appropriate test facility. Internal contractor documentation of component test plans and test procedures is normally used, unless stated otherwise in the contract. However, when a component test is performed at an operational government facility, that government facility may require approval of the test plans and procedures.

4.12.1 Step 1: Hardware components Development contractors shall submit hardware components to in-process tests and evaluations to assure that these components perform within specified design parameters. The hardware component tests shall result in an adequate design criteria to avoid assembling defective hardware items.

4.12.2 Step 1: Computer Software Components. Development contractors shall run computer software component (CSC) tests as required to assure that all algorithms and logic used in each CSC are correct and satisfy their allocated requirements.

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4.13 STEP 2: CI COMPLIANCE TESTS (QUALIFICATION AND ACCEPTANCE)

Step 2 tests may be divided into Step 2.1 and Step 2.2 tests. The Step 2.1 tests are the qualification and acceptance tests of single configuration items (CIs), either a hardware configuration item (HWCI), a computer software configuration item (CSCI), or a CI consisting of both hardware and software. The Step 2.2 tests are the qualification and acceptance tests of combined CIs. The Step 2 tests shall be conducted by the development contractor at in-plant test facilities which may include subcontractor's facilities, at a government approved test bed, or at any other appropriate test facility. If Step 2.1 and Step 2.2 tests are to be conducted in the same test facility or operational area, the advantages of combining the tests into one test plan should be considered. Generally it is best to combine the test plans, test steps, and the test procedures to conserve resources if test quality and thoroughness are not compromised. All Step 2 tests shall be conducted using prequalified test tools. Test procedures shall be designed to attain the test objectives in the approved test plans. A Functional Configuration Audit and a Physical Configuration Audit are normally conducted in accordance with contract requirements following the completion of Step 2.2 tests.

4.13.1 Step 2: Test Execution and Data Recording The development contractor shall provide within its organization a distinct and separate activity which shall have some degree of independence and sufficient responsibility, authority, and resources to perform and conduct the Step 2 tests. The degree of independence may vary with such factors as size, complexity, and criticality of the project. This distinct and separate contractor organization shall conduct these tests as detailed and described in project documentation, such as the software development plan, test plans, test procedures, software test description (STD) documents, and software test execution and report documents. When the Step 2 tests are conducted at an operational site, the site equipment supporting the tests is operated by operations personnel. The development contractor shall update all affected and pertinent documentation for any design changes made to the configuration item (CI) as a result of fixes for deficiencies identified during CI compliance tests. The development contractor shall maintain a record of these tests, including all pertinent analyses, test procedures, data, deficiencies discovered, and equipment and computer programs used. Corrective actions performed by the development contractor shall be included in the test records. All test documentation shall be made available to the Procuring Activity upon request.

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4.13.2 Step 2.1: Single CI Compliance Tests Step 2.1 tests shall be witnessed by the Procuring Activity or its designated representative, the Air Force Plant Representative Office (AFPRO), or the Defense Contract Administration Services Plant Representative Office (DCASPRO). When Step 2.1 tests are conducted at an operational site, the development contractor's product assurance representative, if available at the operational site, shall witness and certify the tests. The site integration contractor representative shall also witness the tests.

4.13.2.1 Step 2.1 Hardware CI Qualification. The development contractor shall formally qualify each hardware configuration item (CI). The qualification tests shall be conducted on the first production item of each CI type using documented test procedures and documented pass-fail criteria. The qualification tests shall verify that the CI meets the specified system design requirements allocated to the CI, including external interfaces. The qualification tests shall verify the performance margins by evaluating the functional performance of the CI in an environment that simulates the operational environments associated with the CI.

4.13.2.2 Step 2.1 Hardware CI Acceptance. The qualification tests on the first production item of each type serves as the acceptance test for that item. The development contractor shall perform formal hardware acceptance tests on subsequent production items of each configuration item (CI) type as required to avoid assembling a defective system. The acceptance tests of the subsequent production items may be a subset of the qualification tests, and can usually be conducted in an ambient condition. The acceptance tests shall be conducted using documented test procedures and documented pass-fail criteria.

4.13.2.3 Step 2.1 Computer Software Configuration Item Qualification. The development contractor shall conduct formal qualification tests on each computer software configuration item (CSCI). The development contractor shall design these CSCI qualification tests to verify CSCI compliance with the design or specified requirements, i.e., stressing the CSCIs to the limits of their specified requirements. Step 2.1 tests associated with software maintenance shall be conducted on the CSCI as required to verify that the deficiency documented in the problem description has been corrected.

4.13.2.4 Step 2.1 Test Plan. The development contractor shall develop a draft test plan of the Step 2.1 test activities. The development contractor shall plan the tests to ensure compliance with the design or specified requirements of the

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configuration items (CIS) involved, including interfaces. The development contractor shall submit a draft test plan to the Procuring Activity. The Procuring Activity reviews the draft test plan and provides an approval or condition for approval to the development contractor. The development contractor shall incorporate the Procuring Activity conditions for approval, if any, into the test plan and submit a final test plan. After notification of Procuring Activity approval of the final test plan, the development contractor shall publish and distribute the final test plan in accordance with contract deliverables. The development contractor shall not make any changes to the approved test plan without approval by the Procuring Activity.

4.13.2.5 Step 2.1 Test Procedures The development contractor shall develop detailed test-procedures designed to attain the test objectives in the approved test plans. The development contractor shall submit the test procedures to the Procuring Activity's implementing organization for review in accordance with contract deliverables. The contractor shall revise the test procedure to incorporate any changes required by the Procuring Activity. The development contractor shall furnish the Procuring Activity with the final test procedures in accordance with contract deliverables.

Any change to the Step 2.1 test procedures that change the intent or objectives of the test plan shall be approved by the Procuring Activity prior to the start, or restart, of Step 2.1 tests, in accordance with contract deliverables. Changes to the test procedures during Step 2.1 tests that do not change the intent or objectives of the test plan shall be redlined and maintained by the contractor. These redlines shall be formally incorporated into the test procedures and provided to the Procuring Activity. Traceability of the requirement, or set of requirements in the system, software, hardware, and interface requirements specifications, to each test case that fully or partially satisfies each requirement or set of requirements, shall be provided in the test procedures.

4.13.2.6 Step 2.1 software Test Plans and software Test Description Documents Some acquisition contracts have requirements for the delivery of a Software Test Plan and a Software Test Description document for the software development involved. In those cases, the requirements stated in this document for the Step 2.1 test plan and Step 2.1 test procedures shall be satisfied in the Software Test Plan and the Software Test Description documents. The contractor shall submit the Software Test Plan and the Software Test Description documents to the Procuring Activity's implementing organization for review and approval in accordance with contract deliverables. The Procuring Activity reviews the Software Test Plan and Software

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Test Description and provides approval or conditions for approval to the development contractor. The development contractor shall incorporate the Procuring Activity conditions for approval, if any, into the Software Test Plan and Software Test Description and shall submit the finished documents to the Procuring Activity. After notification from the Procuring Activity of final approval, the development contractor shall publish and distribute the documents in accordance with the contract deliverables. The development contractor shall not make any changes to the approved Software Test Plan without approval by the Procuring Activity. Procedural portions of the Software Test Description may be redlined during testing; however, these redlines are subject to subsequent approval with the test results.

4.13.2.7 Step 2.1 Test Execution and Report. The contractor shall conduct the Step 2.1 testing using the test procedures or Software Test Description documents as applicable. The contractor shall provide a record of the testing performed including deviations, problems, deficiencies, and results in accordance with contract deliverables, such as in a Software Test Report (STR) document for computer software.

4.13.2.8 Step 2.1 Test Analysis. The development contractor shall conduct analysis of the test data to verify that the item under test functions within specified parameters. If the analysis indicates that the test item functions within specified parameters it shall be documented as verified. Any discrepancies found during the test analysis shall be documented and remain an open issue until further analysis, retest, or both reveals that requirements or specifications have been met. Test analysis documentation is provided at the FCA/PCA to show that all requirements have been satisfied by the item under test.

4.13.3 Step 2.2: combined CI compliance Tests A series of compliance test steps shall be conducted on expanding strings of configuration items (CIs). Typically, a hardware configuration item (HWCI) is combined with other HWCI's and the combination tested, a computer software configuration item (CSCI) is combined with other CSCI's and the combination tested, and then the various CIs are combined until the final end item equipment to be delivered is tested, including the interfaces. The actual combination of CIs to be tested, and the particular test sequence to follow, depend on the complexity of the development, criticality of the functions, and on the external interfaces involved. The tests shall be designed to confirm functional compatibility among the mechanical, electrical, and computer software interfaces. Step 2.2 tests shall demonstrate that the end item functions resulting at each step test of combined CIs meet the performance requirements and system

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specifications. The tests shall be conducted at an approved test bed or, with the approval of the Procuring Activity, at an operational site. To show the planned sequence for the Step 2.2 tests, the detailed tests should be further identified in a combined test plan as Step 2.2.1 tests, Step 2.2.2 tests, etc., for the expanding strings of configuration items. The test sequence shall be combined, where practicable, to conserve resources if test quality and thoroughness are not compromised.

4.13.3.1 Step 2.2 Test Plan The contractor shall develop a draft test plan of the Step 2.2 test activities. The contractor shall plan the tests to ensure compliance with the design or specified requirements of the configuration items (CIs) involved, including interfaces. The contractor shall submit a draft test plan to the Procuring Activity. The Procuring Activity reviews the draft test plan and provides an approval or condition for approval to the development contractor. The contractor shall incorporate the Procuring Activity conditions for approval, if any, into the test plan and submit a final test plan. After notification of Procuring Activity approval of the final test plan, the contractor shall publish and distribute the final test plan in accordance with contract deliverables. The contractor shall not make any changes to the approved test plan without approval by the Procuring Activity.

4.13.3.2 Step 2.2 Test Procedures. The contractor shall develop detailed test procedures designed to attain the test objectives in the approved test plans. The contractor shall submit the test procedures to the Procuring Activity's implementing organization for review. The contractor shall revise the test procedure to incorporate any changes required by the Procuring Activity. The contractor shall furnish the Procuring Activity with the final test procedures in accordance with contract deliverables.

Any change to the Step 2.2 test procedures that change the intent or objectives of the test plan shall be approved by the Procuring Activity prior to the start, or restart, of Step 2.2 tests, in accordance with contract deliverables. Changes to the test procedures during Step 2.2 tests that do not change the intent or objectives of the test plan shall be redlined and maintained by the contractor. These redlines shall be formally incorporated into the test procedures and provided to the Procuring Activity. Traceability of the requirement, or set of requirements in the system, software, hardware, and interface requirements specifications, to each test case that fully or partially satisfies each requirement or set of requirements, shall be provided in the test procedures.

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4.13.3.3 Step 2.2 software Test Plans and software Test Description Documents Some acquisition contracts have requirements for the delivery of a Software Test Plan and a Software Test Description document for the software development involved. In those cases, the requirements stated in this document for the Step 2.2 test plan and Step 2.2 test procedures shall be satisfied in the Software Test Plan and the Software Test Description documents. The contractor shall submit the Software Test Plan and the Software Test Description documents to the Procuring Activity's implementing organization for review and approval in accordance with contract deliverables. The Procuring Activity reviews the Software Test Plan and Software Task Description and provides approval or conditions for approval to the development contractor. The development contractor shall incorporate the Procuring Activity conditions for approval, if any, into the Software Test Plan and Software Test Description, and shall submit the finished documents to the Procuring Activity. After notification from the Procuring Activity of the final approval, the development contractor shall publish and distribute the documents in accordance with the contract deliverables. The development contractor shall not make any changes to the approved Software Test Plan or Software Test Description without approval by the Procuring Activity.

4.13.3.4 Step 2.2 Test Execution and Report The contractor shall conduct the Step 2.2 testing using the test procedures or Software Test Description documents as applicable. The contractor shall provide a record of the testing performed, including deviations, problems, deficiencies, and results in accordance with contract deliverables, such as in a Software Test Report (STR) document for computer software.

4.13.3.5 Step 2.2 Test Analysis The development contractor shall conduct analysis of the test data to verify that the item under test functions within specified parameters. If the analysis indicates that the test item functions within specified parameters it shall be documented as verified. Any discrepancies found during the test analysis shall be documented and remain an open issue until further analysis, retest, or both reveals that requirements or specifications have been met. Test analysis documentation is provided at the FCA/PCA to show that all requirements have been satisfied by the item under test.

4.13.4 Commercial Off the Shelf or Government Furnished Equipment Testing. Commercial off the shelf (COTS) items that are not developed specifically for the acquisition or modification are often included in the system design. Also, government furnished equipment (GFE) may be included in the system design. The COTS or GFE items may be either hardware, software, or a combination of the two. When incorporated in the

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system design, individual tests shall be conducted on the COTS and GFE items prior to incorporation in the configuration items or assemblies. The COTS and GFE shall be included in the testing baseline, that is, as incorporated in the configuration items being tested for compliance. The contractor shall perform and document these tests and certify the adequacy of the COTS and GFE as specified by the individual acquisition contracts. The test shall be conducted at the level of detail necessary to determine whether the COTS and GFE perform satisfactorily, are documented adequately for the application, and satisfy the system requirements allocated to them. This test requirement shall apply to all nondevelopmental software.

4.13.4.1 Commercial off the Shelf or Government Furnished Hardware Tests Tests with commercial off the shelf (COTS) or government furnished equipment (GFE) incorporated into the system under development shall be conducted and completed no later than the start of the Step 3 integrated system tests. The tests shall be designed to determine whether the COTS and GFE satisfy the system requirements allocated to them. The Procuring Activity reserves the right to witness these tests. Test documentation and certification shall be made available to the Procuring Activity upon request.

4.13.4.2 commercial Off the Shelf or Government Furnished Software Tests Tests with nondevelopmental software, i.e., commercial off the shelf (COTS) software, or reusable software, or software supplied as government furnished equipment (GFE), incorporated into the system under development shall be conducted and completed no later than the start of the Step 3 integrated system tests. The tests shall be designed to determine whether the COTS and GFE satisfy the system requirements allocated to them. The Procuring Activity reserves the right to witness these tests. Test documentation and certification shall be made available to the Procuring Activity upon request.

4.14 STEP 3: INTEGRATED SYSTEM TESTING

4.14.1 General Integrated system tests are Procuring Activity system tests designed to exercise, as near as practical and possible, the total system to ensure that the products, which may be from multiple contractors, are integrated, that interfaces are verified, and that all higher level operational requirements or specifications are met. Where practicable, Step 3 integrated system tests shall be performed on integrated configuration items (CIs) installed in an operational system. Whenever possible, these tests shall be conducted at the target site with the support of the operational personnel. A development test bed approved by the Procuring Activity as

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sufficiently simulating the network capability for test purposes may be used for Step 3 tests if target sites, operational complexes, or other suitable operational support areas are not available. The integrated system tests shall incorporate tests of the affected interfaces of the equipment and software with other elements of the network system. The Step 3 tests shall be structured as appropriate to demonstrate design requirements of the system related to such items as performance, electromagnetic compatibility, reliability, maintainability, system safety (hazardous noise, radiation hazards, pressure vessels), logistics supportability, operational procedures, and personnel performance.

Step 3 tests shall be conducted to demonstrate the following, as applicable to the modification or upgrade:

- a. That reliable operation is achieved at specified design limits
- b. That specified system functional and performance requirements are met
- c. That the system can recover from hardware or software malfunctions within a reasonable or specified time without loss of data or control
- d. That performance requirements are met under all required logical or physical device assignment combinations
- e. That the software and hardware modifications or upgrades have not degraded the capability of the system's baseline or of other operational systems
- f. That security mechanisms are in place or incorporated to protect resources from unauthorized access or break-in from illicit users

Tests shall be focused on the external interfaces involved, the use of operational data bases and operational scenarios, and the system requirements from a mission operations perspective.

Whenever the design or coding of a configuration item (CI) is changed, the single and combined CIS involved shall be retested, as necessary, and all documentation pertinent to the changes shall be revised and updated.

4.14.2 Air Force Test Team. Step 3 integrated system tests shall be conducted by the Air Force Test Team (AFTT), or the designated on-site test conductor member of the AFTT (see

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4.14.2.5 Deficiency Prioritization The integration contractor shall prepare and present a prioritized list of deficiency reports at the Air Force Test Team (AFTT) status meeting. Each deficiency report shall include an impact comment to the mission ready status. Prioritization shall be based on operational needs and schedule advocated by the Operating Agency test team representative. Otherwise, the attainment of mission ready status shall be used as the basis for prioritization.

4.15 **STEP 4: INITIAL OPERATIONAL TESTS AND EVALUATIONS**

Initial operational tests and evaluations (IOT&E) are conducted with the equipment in its operational configuration by the operational personnel. For production programs IOT&E are usually conducted to support the production decision. For the satellite control network, IOT&E are conducted to support a full commitment to operational support (see 6.4).

4.15.1 Step 4 Test concept Initial operational tests and evaluations (IOT&E) are conducted in an operational environment to test and evaluate the effectiveness and suitability of the hardware and software in meeting operational requirements. Tests emphasize reliability, maintainability, logistics supportability, operational procedures, and personnel performance. IOT&E are conducted at an operational site under conditions that are as operationally realistic as possible and practical. There should be a joint agreement between the Procuring Activity and the Operating Agency to conduct formal Step 4 tests when required for a modification or upgrade.

4.15.2 Step 4 Test Execution and Documentation. These tests are conducted by operating personnel under the direction of the Operating Agency. Test plans for initial operational tests and evaluations (IOT&E) are the responsibility of the Operating Agency. The Procuring Activity, via its Air Force Test Team (AFTT) or designated integration contractor, supports IOT&E in test planning, conduct, results analysis, and record keeping. Deficiency reporting and resolution during this test phase may follow the established Service/Deficiency Report (S/DR) procedure or technical order procedure (see reference to TO 0035D-54 in Subsection 6.2). Network operational readiness tests or rehearsals with the new or modified resources may be the manifest form of IOT&E.

4.16 **STEP 5: FOLLOW-ON OPERATIONAL TESTS AND EVALUATIONS**

Follow-on operational tests and evaluations (FOT&E) are conducted with the equipment in its operational configuration, using operational software, and by the operational personnel assigned (see 6.4). The Step 5 tests are designed to

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demonstrate and verify the continued capability of the system, with the modification or upgrade incorporated, to support ongoing missions.

4.16.3 STEP 5 TEST CONCEPT. Follow-on operational tests and evaluations (FOT&E) are conducted to refine estimates made during initial operational tests and evaluations (IOT&E) and to identify operational system deficiencies.

4.16.2 Step 5 Test Execution and Documentation. The tests are conducted by operating personnel under the direction of the Operating Agency. The designated integration contractor shall assist in these tests. Test plans and documentation are the responsibility of the Operating Agency. The Operating Agency, with the assistance of the designated integration contractor, is responsible for reporting any deficiencies or needed enhancements discovered during this test phase, via the established Service/Deficiency Report (S/DR) system.

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SECTION 5

DETAILED REQUIREMENTS

5.1 THE AIR FORCE TEST TEAM.

The concept of the Air Force Test Team (AFTT) is based on the nature of Step 3 testing as the Procuring Activity's integrated system test. Integration contractor members and technical assistance contractor members of the AFTT are technically Procuring Activity agents performing and conducting tests that the Procuring Activity must perform. The AFTT concept also includes such areas as Air Force participation during development contractor testing (Step 2), development contractor responsibilities during Step 3 testing, and the test resources to be provided by the Procuring Activity as covered both in the contract and test plans.

5.1.1 Designation Criteria. The sustaining engineering (SE) Procuring Activity decides which modification effort or new installation requires the designation of an Air Force Test Team (AFTT). The determination is based on the size, complexity, or technical risk involved. The members of the AFTT are composed of at least the Air Force project officer, the hardware or software integration contractor representative, with the integration contractor representative as the test conductor at the site. Some software or hardware modifications or new installations may need an AFTT composed only of this membership with the project officer performing the functions of the AFTT test director. However, the combination of modifications into a single package released for testing may significantly increase the size, complexity, and technical risk such that AFTT membership is augmented and a test director is designated by the SE Procuring Activity.

5.1.2 Membership and Developer/Operator coordination. Membership in the augmented Air Force Test Team (AFTT) normally consists of Operating Agency personnel, other hardware and software integration contractor personnel, other Air Force personnel, and personnel from other SE Procuring Activity contract sources. The SE Procuring Activity test and integration organization is responsible for informing the involved Operating Agency of the designation of the AFTT. In turn, the Operating Agency is responsible for informing the SE Procuring Activity test and integration organization of their designated representative to the AFTT. The development contractors shall provide support to the AFTT as requested by the test director within the scope of the test effort and applicable contract provisions.

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5.1.3 Air Force Test Team Independence In the performance of its network integration function, the sustaining engineering Procuring Activity provides independent Air Force Test Team (AFTT) services to other Department of Defense agencies making modifications to the network. The AFTT conducts independent testing with the participation of other agencies when the performance of a complex configuration item (CI) cannot be completely demonstrated and assessed until it is tested in the operational configuration of the operational network. Proper agreement and coordination to preserve the AFTT independence are essential to ensure comprehensive testing. Agreement and coordination also prevent undue or unwanted changes or degradation of baseline network capabilities or performance during and after the integration of modifications into the satellite control network.

5.2 AIR FORCE TEST TEAM TEST DIRECTOR

5.2.1 Responsibility. The Air Force Test Team (AFTT) test director has overall responsibility for the conduct of AFTT testing. The AFTT test director chairs test planning meetings and exercises and maintains control over the test team and associated team resources to ensure that the AFTT conducts the tests in an orderly and timely manner. When required, the test director may request a change of contract provisions related to testing, upon determination that the change does not compromise the integrity of testing and is in the interest of the Procuring Activity. Contract changes require approval by the applicable Procuring Activity contracting officer.

5.2.2 Independence Concept. The test director exercises Air Force Test Team (AFTT) independence while recognizing the valuable contribution made by development organizations and contractors to the test effort.

5.2.3 Contractor Directions The Air Force Test Team (AFTT) test director has overall-management responsibility for the test efforts. During test planning and the conduct of testing, the contractors shall act according to the test director's directions within the scope of the test effort and applicable contract provisions.

5.3 CONTRACTOR HARDWARE MODIFICATION SITE ACCEPTANCE

The general activity flow for site acceptance of a contractor hardware modification is shown on Figure 1.

5.3.1 Modification Package. Developed hardware or modification kits procured via a development contractor are delivered to the target site in a modification package.

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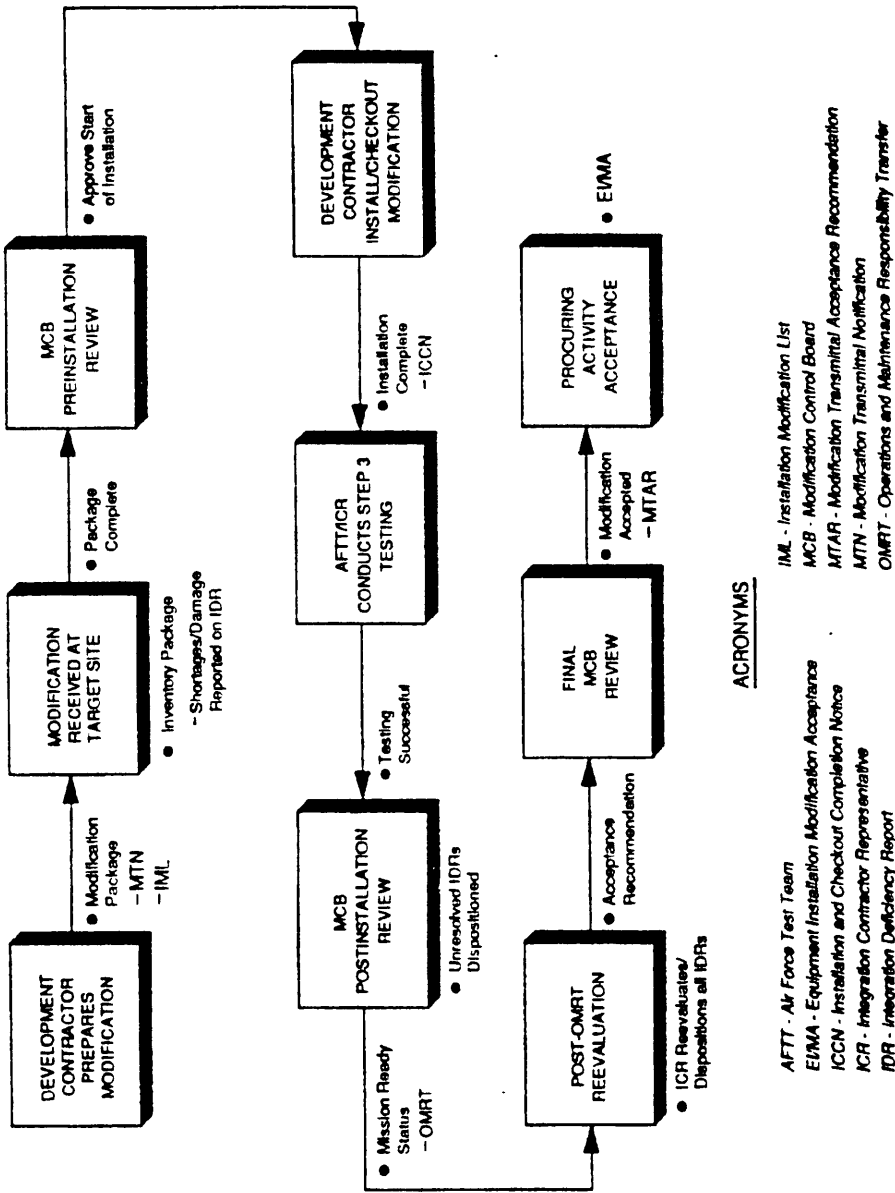


FIGURE 1. CONTRACTOR HARDWARE MODIFICATION SITE ACCEPTANCE FLOW (TYPICAL)

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5.3.1.1 Modification Package Content. For each contractor modification, the development contractor shall prepare a modification package for transmittal to the target site. The modification package may be delivered in increments with each increment documented, but when it is complete, it shall include the following:

- a. All equipment necessary for the modification
- b. Spare parts contractually required to be delivered to the site as part of the modification package
- c* Three copies of equipment and installation drawings and all training and test documentation required for installation and checkout
- d. Any special tools or test equipment required for installation and checkout of the modification
- e. Installation Modification List (IML) (AFSC Form 1871)
- f. Modification Transmittal Notification (MTN, see 5.3.2)
- g. Three copies of preliminary technical documentation needed for operational use and three copies of all technical documentation for commercial off the shelf equipment if used in the modification implementation

5.3.1.2 Delivery Schedule. The modification package shall be available on site a minimum of 10 calendar days prior to the start of installation and checkout. When delivered in increments, each increment shall also be on site a minimum of 10 calendar days prior to the start of installation and checkout for that increment.

5.3.1.3 Inventory Shortage and Damage Reporting. Upon receipt of the modification package, or an increment thereof, the on-site logistic support representative shall inventory the package against the shipping document. The integration contractor representative (ICR) and the development contractor's product assurance representative, if available, jointly inventory the modification package against the Modification Transmittal Notification (MTN, see 5.3.2) by initialing each line item. The product assurance representative shall notify the development contractor for replacements of shortages, or damages. If the product assurance representative is not available, the ICR shall prepare an Integration Deficiency Report (IDR, see Figure 2), for

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INTEGRATION DEFICIENCY REPORT (IDR)

1. SITE _____ CONTROL NO. _____ DATE _____
2. E C P _____ AF ECP _____ OTHER _____ 3. TYPE: 1 2 N/A
4. PROBLEM TITLE: _____
5. PROBLEM DESCRIPTION: _____

6. AFFECTED SUBSYSTEM(S)/EQUIPMENT/OTHER
- | Hardware | | Documentation | |
|------------------|-------|----------------|-------|
| Major Assembly | _____ | Test Procedure | _____ |
| Chassis/Unit(s) | _____ | Drawing # | _____ |
| Component(s) | _____ | PMI # | _____ |
| Part # & Ref Des | _____ | Manual # | _____ |
| | _____ | Other | _____ |
7. MISSION READY STATUS IMPACT COMMENT:
- | | |
|---|-------|
| Mission ready status cannot be attained | _____ |
| Minor impact to mission ready status | _____ |
| Mission ready status not impacted | _____ |
| Mission ready status not applicable | _____ |
8. RECOMMENDED ACTION: _____

9. RECOMMENDED ACTIONEE: _____
10. CORRECTIVE ACTION/RESOLUTION TAKEN: _____

11. DATE OPENED _____ DATE CLOSED _____
- | | | | |
|--|-------|--|-------|
| By (Name, Title or
Contract Function) | _____ | By (Name, Title or
Contract Function) | _____ |
|--|-------|--|-------|
12. SIGNATURE _____ SIGNATURE _____

FIGURE 2. INTEGRATION DEFICIENCY REPORT
(IDR Sample Format)

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all shortages and damages. The ICR shall notify the development contractor and the applicable sustaining engineering Procuring Activity implementing organization by sending each a copy of the IDR.

5.3.1.4 Spare Parts and Special Tools. The process for providing required spares and special tools to support testing of modifications and to support subsequent operations and maintenance varies from contract to contract. The integration contractor representative (ICR) shall obtain the status of necessary spares and special tools from the supplying contractor. The ICR shall generate and send Integration Deficiency Reports (IDRs) to notify applicable contractor and Air Force agencies of any problems concerning special tools and spare parts required for normal operations associated with the modification. These problems must be resolved as early as possible.

5.3.2 Modification Transmittal Notification.

5.3.2.1 Modification Transmittal Notification Content. The Modification Transmittal Notification (MTN) shall identify all items that are contractually deliverable to the site. The MTN shall, at a minimum, contain the following information when supplied to the site:

- a. Engineering Change Proposal (ECP) number (when appropriate) and title
- b. Contract number
- c. Change order or supplemental agreement number (as appropriate)
- d. Date of preparation
- e. A list of all hardware and equipment required for the modification (including all spare parts, special tools, and special test equipment)
- f. A list of the documentation required and delivered to the site for installation and checkout (e.g., engineering drawings, technical publications, test plans, procedures, diagnostic computer programs, training, etc.)
- g. A list of who is responsible for installation and checkout.
- h. Installation instructions and site support requirements

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- i. A list of deficiencies discovered during in-plant testing that have not been cleared at the time the MTN is transmitted to the site
- j. Estimated delivery date of each short-shipped item

A sample format of a Modification Transmittal Notification (MTN) is shown in Figure 3.

5.3.2.2 MTN Authentication. The Modification Transmittal Notification (MTN) shall be provided with signature spaces for the integration contractor representative (ICR) and for the development contractor's product assurance representative, if available at the operational site. The MTN shall bear the signature of the development contractor management officials responsible for the preparation, accuracy, and quality of the modification package content. The MTN shall also bear the signature of the appropriate government administrative contracting representative (Air Force Plant Representative Office, AFPRO, or Defense Contract Administration Services Plant Representative Office, DSACPRO) when delegated. The AFPRO or DCASPRO signature requirement may be waived by the Procuring Activity.

5.3.2.3 Modification Package Acknowledgment. The integration contractor representative (ICR) shall annotate the Modification Transmittal Notification (MTN) for any shortages, damages, or other deficiencies. When all line items on the MTN have been received in acceptable condition, the ICR shall send a copy of the annotated MTN to acknowledge receipt and inspection of the modification package to the sustaining engineering Procuring Activity or System Program Office implementing organization. The ICR shall retain a copy of the annotated Modification Transmittal Notification (MTN) on site and send the original to the development contractor.

5.3.3 Modification Control Board Preinstallation Review. The integration contractor representative (ICR) shall assess the delivered equipment and documentation for adequacy to begin installation, and schedule the presentation of the modification installation to the site Modification Control Board (MCB). The site MCB then reviews the modification. The ICR shall make the presentation to the MCB and shall discuss the development contractor's installation, training, checkout plans, network downtime schedule, missing or short-shipped items, support requirements, and disposition of residual installation and checkout materials. The MCB then approves or disapproves the start of installation. Any planned use of the modification for a full or partial operational support prior to the Operations and Maintenance Responsibility Transfer (OMRT) must be requested in writing by the Operating Agency on site at this MCB review (see 5.3.7).

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MODIFICATION TRANSMITTAL NOTIFICATION (MTN)

ECP NO: _____ DATE _____

ECP TITLE: _____

COORDINATION :

Program Manager (contractor) Date

Product Assurance (if available) Date

Configuration Data Manager Date

AFPRO/DCASPRO (if delegated) or SPO Date

SITE RECEIPT OF MODIFICATION PACKAGE IS HEREBY ACKNOWLEDGED WITH THE FOLLOWING DEFICIENCIES NOTED:

ITEM STATUS

Product Assurance Representative Date
(if available)

Integration Contractor Representative Date

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FIGURE 3. MODIFICATION TRANSMITTAL NOTIFICATION
(MTN Sample Format, page 1 of 2)

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MODIFICATION TRANSMITTAL NOTIFICATION (MTN) (Continued)

TO: STATION COMMANDER FROM : XYZ Manufacturing

ECP Title: Zenon Power Amp Company: XYZ Mfg

ECP No: Contract No: _____ SA: _____ Date:

1. THE FOLLOWING HARDWARE IS REQUIRED FOR THIS MODIFICATION:

ITEM NO.	PART	DESCRIPTION SERIAL NO. & AF TAG NO.	QTY REQ	DROP/ SHORT	<u>Received</u> Initials Date	
1	XYZ-001	AC Power Supply	1	N/A	XYZ	XXX
:						
:						
5	XYZ-005	N26 Chassis	3	N/A	XYZ	XXX

2. THE FOLLOWING DOCUMENTS ARE REQUIRED FOR THIS MODIFICATION:

ITEM NO.	DOC NO.	REV	DESCRIPTION/ TITLE	QTY REQ	DROP- SHORT	REQ'D FOR SHIPM'T	<u>Received</u> Site Initials Date		
1	XYZ-AB1	A	Wiring List	6	N/A	2	1	XYZ	XXX
:									
:									
12	XYZ-AB12	1	Amplifier	6	N/A	2	2	XYZ	XXX

3. INSTALLATION AND CHECKOUT BY: _____ DEVELOPMENT CONTRACTOR
_____ SITE O&M

4. THE FOLLOWING OPEN IN-PLANT DEFICIENCIES ARE ATTACHED AND FORWARDED:

REPORT NO.	BRIEF DESCRIPTION	DATE RELEASED
SR-012	AC Power Supply Noise Transients	XXXX

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FIGURE 3. MODIFICATION TRANSMITTAL NOTIFICATION
(MTN Sample Format, page 2 of 2)

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5.3.4 Scheduling Network Downtime. The site integration contractor representative (ICR) shall submit network downtime requests required for site installation, checkout, and testing to the applicable satellite control network resource scheduling agency.

5.3.5 Instanation and Checkout Installation consists of the installation or modification of equipment. Checkout is the contractually prescribed method of testing by the development contractor or installing agency. The integration contractor representative (ICR) shall monitor the installation and checkout of modifications as the sustaining engineering (SE) Procuring Activity agent on site.

5.3.6 Instanation and Checkout Completion Notice.

5.3.6.1 Integration Contractor Representative Responsibility. The integration contractor representative (ICR) shall prepare the Installation and Checkout Completion Notice (ICCN) and forward the notice to the Procuring Activity implementing organization. A sample format of an ICCN is shown in Figure 4. The ICR shall retain a copy of the signed ICCN on site and shall send a copy to each of the following:

- a. Air Force Plant Representative Office (AFPRO) or Defense Contract Administration Services Plant Representative Office (DCASPRO), if applicable
- b. The sustaining engineering Procuring Activity configuration management office
- c* The development contractor
- d. Integration contractor

All unresolved deficiencies and Integration Deficiency Reports (IDRs) shall be attached to the ICCNs.

5.3.6.2 Installation and Checkout Completion Notice Significance The signed Installation and Checkout Completion Notice (ICCN) acknowledges only the physical completion and checkout of the site portion of the installation or modification. No contractual acceptability of the modification or its documentation is expressed or implied by the ICCN. When temporary control for safekeeping is in order, the ICCN also implies the temporary control for equipment safekeeping by the site operations and maintenance organization.

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INSTALLATION AND CHECKOUT COMPLETION NOTICE

(On Integration Contractor Letterhead)

Reply

Attn of: (Office Symbol)

Subject: INSTALLATION AND CHECKOUT COMPLETION NOTICE (ICCN),
ECP _____ (or AFECF if applicable)

To: Procuring Activity (Implementing Organization)

1. The installation of the subject ECP (or AFECF) _____ has been completed at (identify site). This acknowledges only the physical completion of the site portion of the modification. No contractual acceptability of the modification or its documentation is expressed or implied.

2. All known deficiencies that were unresolved as of the above date are listed below. Copies of these deficiencies are attached to this notice with redlined documentation where appropriate.

3. Temporary safekeeping of the installation and associated equipment has been authorized by the MCB chairman. (Refer to 5.3.6.2 for reference and 5.3.7 for guidance and need to include this paragraph)

IDR No.

Problem Title

Date

Site Integration Contractor Rep.

Attch:
Open Deficiency Reports

cc : _____

FIGURE 4. INSTALLATION AND CHECKOUT COMPLETION NOTICE
(ICCN Sample Format)

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5.3.6.3 Validation of Technical Documentation. As part of the installation and checkout, validation of procedural material in the preliminary documents shall be conducted by the development contractor as specified in the applicable acquisition contract. Validation is normally accomplished at the first site to complete installation and checkout by performing the actual procedures (alignment, adjustment, troubleshooting, remove-replace, etc.) in each technical publication. (Note that since network downtime availability and other restrictions may impact completion schedules the first site to complete installation and checkout may not be the site where installation and checkout was first initiated.) The validation shall be witnessed by a designated representative of the Procuring Activity. Both the development contractor and the designated witness of the Procuring Activity sign the validation report. The development contractor shall provide one copy each of the report to the site integration contractor representative (ICR) and the Operating Agency on-site representative, and shall retain the original.

5.3.7 Modification Control Board Post installation Review. Following completion of Step 3 testing, the site Modification Control Board (MCB) reviews the installed modification or upgrade for installation completeness, and documentation of all known deficiencies associated with the modification. The site integration contractor representative (ICR) shall brief the MCB of the installation status, checkout results, associated unresolved deficiencies, and recommended actions. When required Step 3 testing cannot be performed right after installation and checkout, the ICR shall formally request that the MCB chairman provide for equipment safekeeping by the site operations and maintenance organization. Another MCB review should be held at a later date after all required development tests are performed. A modification or installation at this stage is not to be used for operational use, fully or partially, without the consent of the Procuring Activity. The site integration contractor representative (ICR) shall send a recommendation of the feasibility for any requested use to the Procuring Activity. The recommendation shall also define the contractual implications of using equipment before installation or testing is complete such as, who should be responsible for maintenance, the effect on continued testing, and status of equipment acceptance.

5.3.8 Mission Ready Status. A system is considered to be in mission ready status when:

- a. No unacceptable human safety risk exists
- b. All flight critical Type 1 and all flight critical Type 2 deficiencies are resolved,

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- c. Required development and evaluation testing has demonstrated that the installed modification supports mission operational requirements as specified, and
- d. All preliminary technical documentation for operation of the modification has been checked and redlined for adequacy in operational and maintenance use.

When all of these items are true, the Air Force Test Team (AFTT) test director formally notifies the Operating Agency on-site representative of mission ready status by issuing the Operations and Maintenance Responsibility Transfer (OMRT) letter (see Figure 5) or causing it to be issued by the integration contractor representative (ICR).

5.3.9 Operations and Maintenance Responsibility Transfer.
The function of the Operations and Maintenance Responsibility Transfer (OMRT) letter (see Figure 5) is to formally transfer the operations and maintenance responsibility of newly installed or modified equipment to the site Operating Agency. The integration contractor representative (ICR) shall prepare the OMRT Letter when mission ready status has been attained, as directed by the Air Force Test Team (AFTT) test director. The ICR is authorized to sign the letter for the test director unless otherwise notified by the test director. The XCR coordinates the OMRT with the site operations and maintenance organization, then forwards it to the Operating Agency on-site representative for endorsement to the Procuring Activity or the Procuring Activity implementing organization. The integration contractor representative (ICR) shall attach a copy of all unresolved (open) Integration Deficiency Reports (IDRs) associated with the modification to the OMRT notification letter. The ICR shall retain a copy of the endorsed OMRT notification letter on site and send the original to the Procuring Activity or the Procuring Activity implementing organization. The ICR shall send a copy with all attachments to each of the following:

- a. Development contractor,
- b. Site operations and maintenance organizations,
- c. Logistics support organization
- d. The sustaining engineering Procuring Activity configuration management office
- e. Integration contractor

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REPLY TO

ATTN OF: Air Force Test Team Director (Name, Grade, Off. Symbol
(or Minor Modification Project Officer)

SUBJECT: Operations and Maintenance Responsibility Transfer
(OMRT)

TO: Site Commander

Testing and inspection of ECP (or AFCEP) _____,
installed in the following work center(s):
_____, has verified that the
modification installed by the above ECP meets or
exceeds performance criteria and station configuration
requirements for the support of operations.

For the test director, (or Minor
Modification Project Officer)

(Integration Contractor Representative)

Coordination: _____
Site O&M Manager

1st Endorsement, (Operating Agency Site Representative)

TO: (Procuring Activity) or
(Procuring Activity Implementing Organization)

Responsibility for the operations and maintenance of
the subject modification is hereby accepted by station
personnel as of:

Local Time: _____ Date: _____

Operating Agency Site Representative
(Name, Grade, Title)

Attach ; Open Integration Deficiency Reports (IDR)

cc

FIGURE 5. OPERATIONS AND MAINTENANCE RESPONSIBILITY TRANSFER
NOTIFICATION (OMRT Sample Format)

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5.3.10 OMRT Notification Significance. The endorsement of the Operations and Maintenance Responsibility Transfer (OMRT) notification letter formally represents turnover and signifies the readiness of the modification or installation to support mission requirements and officially transfers operations and organizational maintenance responsibility to the Operating Agency. OMRT does not release a contractor from contractual performance or delivery requirements (hardware or documentation).

5.3.11 Reporting Deficiencies. For deficiencies uncovered during on site development tests and evaluations (DT&E), the integration contractor representative (ICR) shall report all deficiencies not covered by the contractor's quality assurance deficiency reporting program as Integration Deficiency Reports (IDR). Deficiencies uncovered during integrated system testing, shall be reported as IDRs. The ICR shall categorize each of the deficiencies by type as defined, and shall include in the IDR a description of the problem, a recommended action, a recommended actionee, and comments on the impact of each deficiency on the mission ready status of the modification. The ICR shall compile and maintain the IDRs, and retain the original copy on file at the site. The ICR shall transmit a copy of each of the IDRs as they are generated to:

- a. The Air Force Test Team (AFTT) test director
- b. Procuring Activity Contract Management Office
- c. Procuring Activity Project Office
- d. Development contractor
- e. Integration contractor

5.3.11.1 Reporting Deficiencies During Contractor on Site Testing. From the arrival of the modification package on site to the completion of contractor testing, the integration contractor representative (ICR) shall report all deficiencies not covered by the contractor quality assurance deficiency reporting program as Integration Deficiency Reports (IDRs). All deficiencies uncovered during development tests and evaluations conducted in this time interval shall be treated as test data of the particular development test and evaluation (DT&E). The ICR shall track and monitor the development contractor's deficiency reports that are not cleared by this time.

5.3.11.2 Reporting Deficiencies During Integrated System Testing. During integrated system testing and up to the signing of the Modification Technical Acceptance Recommendation (MTAR), the integration contractor representative (ICR) shall

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report all deficiencies from all sources as Integration Deficiency Reports (IDR). These include contractor deficiencies not cleared by the development contractor at the end of Step 3 tests. The ICR shall prepare an IDR for each of these deficiencies. Any deficiency found after MTAR is reported using the established Service/Deficiency Report system.

5.3.12 OMRT Constraints.

5.3.12.1 Late Change of Requirements. Operations and Maintenance Responsibility Transfer (OMRT) for a modification is processed only after the modification is ready to support the mission. Unforeseen events, such as a change to requirements late in this process, may prevent a modification from attaining mission ready status even if the Air Force Test Team (AFTT) concluded that the modification test item(s) performed as specified and all identified Type 1 deficiencies had been corrected. When such an event occurs, the Procuring Activity determines the appropriate action. The scope of the modification effort may be expanded or redirected by the Procuring Activity or System Program Office to attain mission ready status.

5.3.12.1.1 Test Conclusion Letter. A test conclusion letter may be generated if the expansion or redirection of the modification is not appropriate. The sustaining engineering Procuring Activity or the implementing System Program Office requests the integration contractor representative (ICR) to generate a letter addressed to the test director attesting to the conclusion of the test and that the test item has performed as specified. The test director endorses the letter to the appropriate contracting officer with a copy to the development contractor for input to the DD Form 250.

5.3.12.1.2 Constraint Resolution. The method of resolving deficiencies, which preclude the attainment of mission ready status by the modification, depends on the impact to current operations and the economic advantages to the government. Any Type 2 deficiencies that preclude completion of Operations and Maintenance Responsibility Transfer (OMRT) may be converted into a Service/Deficiency Report (S/DR). Depending on the advantages to the government, a modification that cannot attain mission ready status may be either removed from the site, or may remain on site for possible future remodification.

5.3.12.2 Verification of Technical Documentation. Preliminary and corrected preliminary documents are verified by operations and maintenance personnel to assure that the technical documentation provided by the development contractor is accurate and adequate for operating and maintaining the

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equipment. While only the first site may verify preliminaries, all sites are normally tasked to verify corrected preliminaries of all new or revised documents. Quality control inspectors, in conjunction with operations personnel, perform or monitor the verification. Preventive Maintenance Instructions usually require 100-percent verification, while the degree of verification required of Technical Manuals and Vendor Manuals shall be determined by the Operating Agency on-site representative.

5.3.13 Deficiency Resolution.

5.3.13.1 Air Force Test Team Activities. The Air Force Test Team (AFTT) test director convenes test-status meetings as needed to discuss the progress of the installation or tests, analyze available test results, and provide disposition for Integration Deficiency Reports (IDRs) that result from installation or testing. Deficiencies (Type 1 or Type 2) are assessed as to accuracy and validity. Possible impacts to the mission ready status are reviewed. The development contractor shall present its approach and schedule to resolve all Type 1 deficiencies. The development contractor may also be asked to make recommendations for solutions to Type 2 deficiencies. The integration contractor, or integration contractor representative (ICR), shall retest as necessary to ensure that those deficiencies found during Step 3 testing, either Type 1 or Type 2, are corrected or otherwise resolved. The ICR shall formally close each IDR only when retesting or formal inspection proves that the deficiency has been corrected. After successful resolution of each deficiency, the applicable Integration Deficiency Report (IDR) shall be completed and formally closed by the integration contractor representative (ICR). All addressees of IDRs are furnished a copy of the closure. Type 2 deficiency reports (from Step 2 or Step 3 tests) that prevent the attainment of mission ready status shall be forwarded to the sustaining engineering Procuring Activity implementing organization for resolution.

5.3.13.2 Post-OMRT Reevaluation. After Operations and Maintenance Responsibility Transfer (OMRT), the site integration contractor representative (ICR) shall reevaluate all unresolved (open) Integration Deficiency Reports (IDRs) on the modification for continued applicability. Type 1 IDRs with little or no impact to mission ready status may remain on file for resolution by the contractor or relief of compliance by the Procuring Activity contracting officer. The development contractor shall provide a time schedule for resolution of Type 1 IDRs to the site ICR and the implementing organization. Unresolved IDRs may be retained as an IDR or converted to either Service/Deficiency Reports (S/DRs) or Air Force

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Technical Order (AFTO) Forms 22, "Technical Order System Publication Improvement Report and Reply," as directed by the sustaining engineering Procuring Activity implementing organization. The Modification Technical Acceptance Recommendation (MTAR) is not to be endorsed until all Type 1 Integration Deficiency Reports (IDRs) are corrected or resolved through permanent or temporary relief of compliance. If IDRs are converted to Service/Deficiency Reports (S/DRs) or AFTO Forms 22, the integration contractor representative (ICR) shall submit the converted reports in accordance with established procedures for the two reports. If the IDR is converted to a S/DR, the ICR shall insert the assigned S/DR number in the "Corrective Action/Resolution Taken" block of the IDR. The date of conversion from IDR to S/DR shall be entered in the "Date Closed" block. All addressees of IDRs are furnished a copy of the closure.

5.3.13.3 Post-OMRT Resolution. If a Type 1 Integration Deficiency Report (IDR) is to be resolved after Operations and Maintenance Responsibility Transfer (OMRT) by the development contractor, the development contractor shall send the modification package for the IDR resolution to the site(s). This modification package shall be preceded or accompanied by either:

- a. A new Modification Transmittal Notification (MTN), if required, or
- b. A copy of the original MTN, properly annotated for previous and new deliveries, as appropriate

This IDR resolution package shall be on site a minimum of 10 calendar days prior to start of installation and shall be subject to Modification Control Board review as appropriate.

5.3.14 Acceptance of Contractor Modifications When a modification is complete the site integration contractor representative (ICR) shall prepare a Modification Technical Acceptance Recommendation (MTAR) letter. A sample format for the MTAR is shown in Figure 6). The MTAR shall be prepared before the Modification Control Board (MCB) final modification review and is to be available for signing by the MCB chairman at the completion of this meeting. The ICR retains a copy of the letter for site records, then sends the originals of the signed MTARs to the project officer.

After the Modification Technical Acceptance Recommendation (MTAR) letters from all applicable sites are received, the project officer prepares and signs the Equipment Installation/Modification Acceptance (EI/MA) letter (see Figure 7).

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REPLY TO
ATTN OF: Site Commander

SUBJECT: Site Modification Technical Acceptance
Recommendation

TO: (Procuring Activity) or
(Procuring Activity Implementing Organization)

1. The equipment, (site spare parts, test equipment, tools, other logistic support factors, etc.) for Change Order/Contract No. _____ Engineering Change Proposal (ECP) or AFEC (as applicable) _____ as indicated on the Modification Transmittal Notification (MTN) for the ECP, have been received, installed, and checked out. Corrected preliminary (or final as appropriate) copies of validated technical documentation have been received and verified.

2. The subject ECP or AFEC (as applicable) meets performance criteria required for operations and maintenance and is recommended for acceptance.

Operating Agency On-site Representative
(Name, Grade, Title)

cc : _____

FIGURE 6. MODIFICATION TECHNICAL ACCEPTANCE RECOMMENDATION
(MTAR Sample Format)

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REPLY TO
ATTN OF:

project Officer (Name, Grade, Office Symbol)

SUBJECT:

Site Equipment Installation/Modification
Acceptance, ECP (or AFCEP) _____.

TO:

Procuring Activity Contract
Management Office

1. The installation (or modification) authorized under Change Order/Contract No. _____ ECP (or AFCEP as applicable) _____, has been received, installed, and checked out. Corrected preliminary (or final if provided for by contract) copies of technical data have been received and verified.

2. The subject ECP (or AFCEP as applicable) meets specified performance criteria required for operations and maintenance.

3. This certification effects the formal acceptance of the subject modification by the (Air Force Procuring Activity)

Project Officer
(Name, Grade, Title)

Procuring Activity
(Name, Grade, Title)

cc : _____

FIGURE 7. EQUIPMENT INSTALLATION/MODIFICATION ACCEPTANCE
(EI/MA Sample Format)

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The originals of both the Equipment Installation/Modification Acceptance (EI/MA) and the Modification Technical Acceptance Recommendation (MTAR) letters are forwarded to the appropriate Procuring Activity program director or authorized representative for endorsement of the EI/MA letter. After endorsement, the project officer forwards:

- a. The originals of both the EI/MA and MTAR letters to the contracting officer
- b. A copy of the signed EI/MA to the site ICR for site records
- c. A copy of both the EI/MA and MTAR letters-to the Procuring Activity implementing organization
- d. A copy of both the EI/MA and MTAR letters to the development contractor as an input to the DD Form 250 (Material Inspection and Receiving Report)
- e. Copies of both the EI/MA and MTAR letters to the AFPRO/DCASPRO, the applicable maintenance organization, and the applicable logistics organization

Note: This procedure also applies to contractor minor modifications (See 5.4.12.1).

5.3.14.1 Modification Technical Acceptance Recommendation.
The function of the Modification Technical Acceptance Recommendation (MTAR) letter on a contractor modification, when signed by the Operating Agency on-site representative, is to effect formal acknowledgment that an installation or modification is complete and meets specified performance requirements. When all Type 1 deficiencies have been corrected or resolved, and the accuracy and acceptability of corrected engineering data (drawings, wirelists) and preliminary (or final as appropriate) technical documentation (manuals, handbooks, preventive maintenance instructions, etc.) have been validated by tests, exercises, and inspections, the integration contractor representative (ICR), with the project officer's approval, shall prepare the MTAR letter and present the modification to the Modification Control Board (MCB) for final review. The ICR shall brief the MCB of modification completion and the effect of any open Type 2 deficiencies on site operational effectiveness. Upon MCB concurrence of completion, the site ICR shall present the MTAR to the MCB chairman for signature.

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5.3.14.2 Equipment Installation/Modification Acceptance.

The function of the Equipment Installation/Modification Acceptance (EI/MA) letter is to certify the formal acceptance of an installation or modification by the Procuring Activity. This letter is prepared by the project officer after receipt of all Modification Technical Acceptance Recommendation (MTAR) letters from all applicable sites where the modification was completed. The EI/MA letter is signed by the project officer and is to be presented to the Procuring Activity for final endorsement. A copy of the signed and endorsed EIfMA is then sent to the integration contractor and to the development contractor for inclusion with the DD Form 250.

5.4 MINOR HARDWARE MODIFICATION SITE ACCEPTANCE

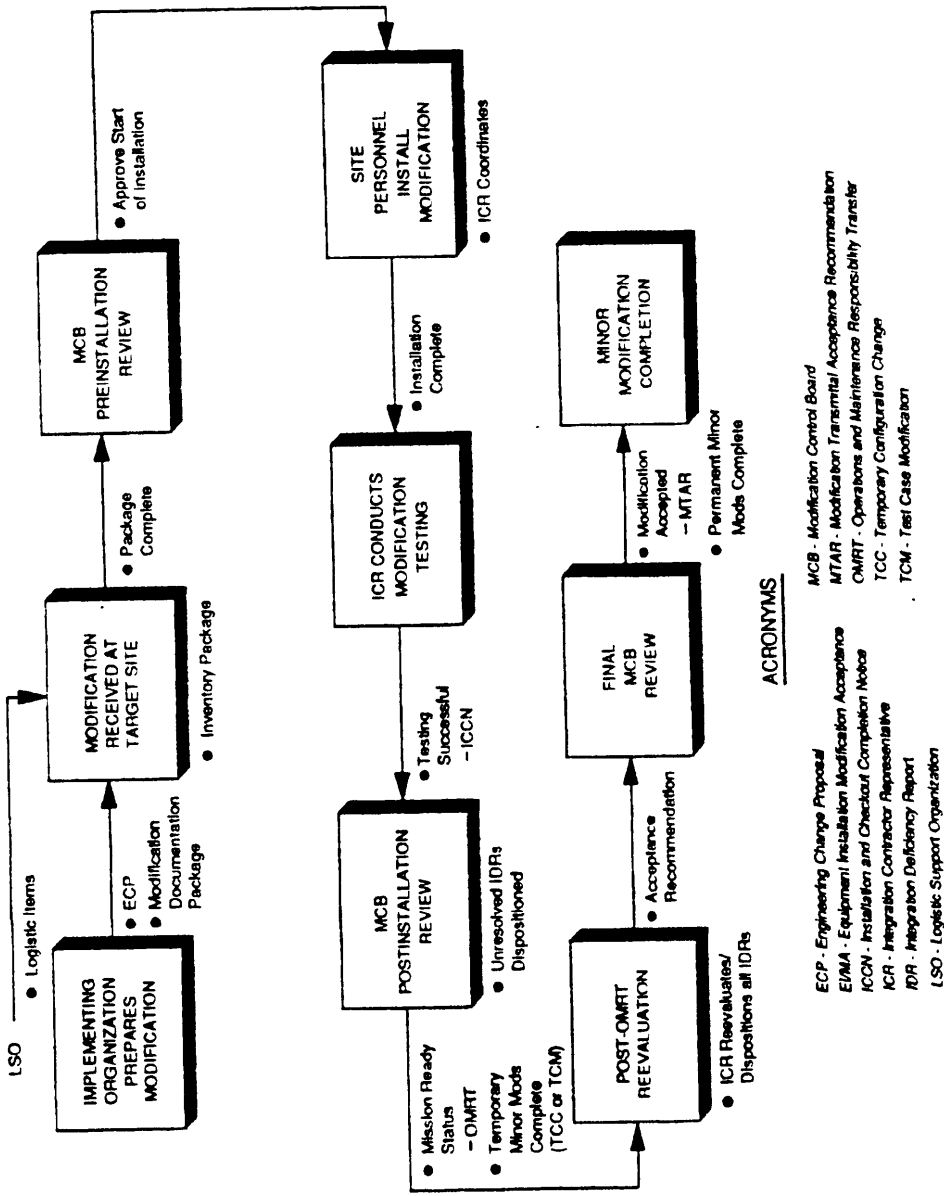
The general activity flow for site acceptance of a minor hardware modification is shown on Figure 8.

5.4.1 Minor Modifications. Minor modifications, as defined herein, refer to temporary or permanent modifications to satellite control network resources (except software) which are of low technical risk and can be implemented with reduced reviews and documentation, and hence provide a cost saving approach to the implementing organization. These modifications may include temporary modifications to the configuration to determine the feasibility of a permanent modification engineering approach or a temporary support to an identified operational need. A minor modification can be either a hardware modification, a documentation change, or both. Minor modifications may be implemented by a contractor's Engineering Change Proposal (ECP) or using level-of-effort resources.

5.4.2 site Modification Review and Approval Notification. Prior to transmitting a minor modification package to the target site(s), the implementing organization forwards a preliminary copy of the Air Force Engineering Change Proposal (AFECP) document to the site(s) for review and comments. When the modification is approved by the implementing organization, after review of and incorporation of comments, approval notification with the approved AFECP documentation is sent to the target site(s).

5.4.3 Site Delivery of Minor Modifications

5.4.3.1 Documentation Package An Air Force Engineering Change Proposal (AFECP) documentation package consists of the documentation required for the target site(s) preinstallation review and coordination for installation. The implementing organization responsible for minor modifications provides the modification documentation packages to the target site(s).



ACRONYMS

- ECP - Engineering Change Proposal
- E/IMA - Equipment Installation Modification Acceptance
- ICCN - Installation and Checkout Completion Notice
- ICR - Integration Contractor Representative
- IDR - Integration Deficiency Report
- LSO - Logistic Support Organization
- MCB - Modification Control Board
- MTAR - Modification Transmittal Acceptance Recommendation
- OMRT - Operations and Maintenance Responsibility Transfer
- TCC - Temporary Configuration Change
- TCM - Test Case Modification

FIGURE 8. MINOR HARDWARE MODIFICATION SITE ACCEPTANCE FLOW (TYPICAL)

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Details in these modification documentation packages include, but are not limited to, the following:

- a. Minor modification number, title, and priority assignment
- b. Three copies of redlined engineering data, information sketches, maintenance documentation, and connector assembly instructions, as required
- c. Cable numbers and labels, as required
- d. Special tools list
- e. Parts and spares lists
- f. Test requirements and procedures
- g. Authorized period (if temporary)
- he Installation instructions and support requirements
- i. Special operating and data recording instruction (if used to support an engineering approach)

The contractor minor modification installation package shall be as specified in the approved Engineering Change Proposal (ECP).

5.4.3.2 Temporary Minor Modification Package For temporary modifications, the modification package may contain only that documentation necessary to install the modification, such as redlined drawings or other data describing the actual changes to be made. The expiration date shall be correlated by the integration contractor representative (ICR) to the removal criteria stated in the temporary modification document. The ICR shall maintain a suspense file to track temporary modification expiration dates.

5.4.3.3 On-Site Receipt and Review. The target site integration contractor representative (ICR) shall receive, inventory, and review these packages for presentation to the site Modification Control Board.

5.4.3.4 Logistics Delivery. Logistics deliveries (hardware, kits, parts, spares, etc.) supporting minor modifications are made directly from the logistics support organization to its logistics support representative (if available) or the integration contractor representative (ICR) at the target site. The logistics support representative and the

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ICR shall inventory each delivery against the minor modification package lists, and coordinate and resolve any shipping discrepancies (breakage, missing items, etc.) with the logistic support organization, and the implementing organization responsible for the minor modification. The implementing organization is responsible for the acquisition and logistics deliveries, including special tools required for the minor modification.

5.4.4 Modification Control Board Preinstallation Review. Prior to the installation and when the modification kit is complete with all necessary documentation, tools, and test equipment, the integration contractor representative (ICR) presents the modification to the Modification Control Board (MCB) for approval to start installation. At this time the schedule for installation, checkout, and risk to current operational capability and support requirements are discussed and the MCB Chairman then approves or disapproves the start of installation.

5.4.5 Installation and Checkout The integration contractor representative (ICR) shall maintain surveillance of the installation and checkout of minor modifications by site operations and maintenance personnel. The ICR shall also coordinate the quality assurance and control inspections. The ICR shall submit network downtime requests to the resource scheduling agency.

5.4.6 Minor Modification Tests Minor modification tests are required. The off-the-shelf nature of the hardware or kits used is taken into account when testing minor modifications. Test requirements and procedures shall be included in the modification package sent to the target site. The integration contractor representative (ICR) shall conduct the tests in accordance with these requirements and ensure that the modification does not degrade the site baseline capability. If appropriate, the ICR may conduct additional tests beyond those identified in the package.

5.4.7 Installation and Checkout completion Notice After completion of the minor modification tests, the integration contractor representative (ICR) shall prepare and forward the installation and checkout completion notice (ICCN) for coordination and signature. This notification acknowledges physical completion of the site portion of the modification only. No acceptability of the modification or its documentation is implied or expressed in the ICCN. All unresolved deficiencies, including all open associated Integration Deficiency Reports (IDRs,) are attached to the ICCN. The ICR

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shall retain a copy of the ICCN and send copies to the organization implementing the modification, with redlined documentation as required. A copy with all IDRs attached shall also be sent to the integration contractor.

5.4.8 Modification Control Board Postinstallation Review. After installation and checkout of a minor modification is complete the integration contractor representative (ICR) shall present the results of the modification effort to the Modification Control Board (MCB). All known deficiencies shall be documented by Integration Deficiency Reports (IDRs). The MCB reviews the modification and all associated IDRs. Any problems which affect site capability and support requirements are discussed by the MCB, and recommendations are made to the Operating Agency on-site representative.

5.4.9 Mission Ready Status. A system is considered to be in mission ready status when:

- a. No unacceptable human safety risk exists
- b. All flight critical Type 2 deficiencies are resolved,
- c* Required development and evaluation testing has demonstrated that the installed modification supports mission operational requirements as specified, and
- d. All preliminary technical documentation for operation of the modification has been checked and redlined for adequacy in operational and maintenance use.

The integration contractor representative (ICR) shall - formally notify the Operating Agency on-site representative that the modification is ready for mission support or for temporary use. The ICR shall prepare an Operations and Maintenance Responsibility Transfer (OMRT) notification, and forward the notification for coordination and endorsement.

5.4.10 Reporting Deficiencies The site integration contractor representative (ICR) shall prepare an Integration Deficiency Report (IDR) for each deficiency found during installation and testing. Copies of IDRs shall be forwarded to the implementing organization for resolution. The ICR shall compile and maintain a status of these reports and retain the original on file.

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5.4.11 Deficiency Resolution. The implementing organization is responsible for correcting the deficiencies attributed to the modification, and coordinating the proper method of resolution. The site is responsible for those deficiencies that are installation peculiar, i.e., workmanship and safety. After Operations and Maintenance Responsibility Transfer (OMRT), unresolved Integration Deficiency Reports (IDRs) shall be reevaluated by the integration contractor representative (ICR) for continued applicability. The reevaluation should result in one of the following:

- a. Converting the IDR to a Service/Deficiency Report (S/DR)
- b. Submitting an Air Force Technical Order (AFTO) Form 22, "Technical Order System Publication improvement Report and Reply"
- c. Revising the minor modification
- d. Recommending another modification (minor or major)
- e. Leaving the IDR active (open) if it is against a temporary minor modification

After successful resolution of each deficiency, the applicable Integration Deficiency Report (IDR) shall be completed and formally closed by the integration contractor representative (ICR). All addressees of IDRs are furnished a copy of the closure.

5.4.12 Acceptance of Minor Modifications. The procedure for acceptance of minor modifications varies because of the nature and purpose of the minor modification. The following paragraphs describe the acceptance process for the various types of minor modifications: Contractor minor modification, Air Force Engineering Change Proposal (AFECP), Test Case Modification (TCM), or Temporary Configuration Change (TCC).

5.4.12.1 Acceptance of Contractor Minor Modifications. Any contractor minor modification, identified by a contractor Engineering Change Proposal, either permanent or temporary, shall be treated as any other contractor modification for the purpose of acceptance (see 5.3.14).

5.4.12.2 Acceptance of Permanent Minor Modifications Acceptance of permanent minor modifications identified by an Air Force Engineering Change Proposal are effected by the Operations and Maintenance Responsibility Transfer (OMRT) and the Modification Technical Acceptance Recommendation (MTAR).

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5.4.12.2.1 OMRT for Permanent Minor Modifications. The Operations and Maintenance Responsibility Transfer (OMRT, see 5.3.9 and Figure 5) represents the interim acceptance for a permanent minor modification for operations. OMRT is processed when the permanent minor modification has been installed, tested, has reached mission ready status and is accepted for operations by the Operating Agency. The site integration contractor representative (ICR) shall prepare and present the OMRT letter for coordination and endorsement, by the Operating Agency on-site representative, at the Modification Control Board (MCB) post modification review. After the OMRT letter is endorsed, the site ICR shall retain a copy and send the original of the OMRT to the implementing organization project officer. Copies shall be distributed to the following:

- a. Site operations and maintenance organization
- b. Appropriate logistics organizations
- c. Sustaining Engineering (SE) Procuring Activity configuration management office
- d. Integration contractor

5.4.12.2.2 MTAR for Permanent Minor Modifications. The Modification Technical Acceptance Recommendation letter (MTAR, see 5.3.14.1 and Figure 6) represents final acceptance for permanent minor modifications. The MTAR is processed when all Type 2 deficiencies have been corrected or resolved, and the accuracy and acceptability of corrected engineering data (drawings, wirelists) and preliminary technical documentation (manuals, handbooks, preventative maintenance instructions, etc.) have been validated by tests, exercises and inspections. The ICR shall prepare and present the MTAR for signature by the Operating Agency on-site representative at the MCB post installation review. MTARs effect the formal acknowledgment by the Operating Agency on-site representative that the modification is complete and meets specified performance and documentation requirements. The signed MTAR is also the final document required for completion of a permanent minor modification by the implementing organization. The site ICR shall retain a copy of the signed MTAR on site, and send the original to the implementing organization project officer. Distribution of copies of the MTAR shall be the same as for the Operations and Maintenance Responsibility Transfer (OMRT).

5.4.12.3 Acceptance of Temporary Minor Modifications. Temporary minor modifications, identified as Test Case Modifications (TCM) or Temporary Configuration Changes (TCC), are accepted for operational use when required checkout and

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testing results indicate readiness for operational use. The site integration contractor representative (ICR) shall prepare the Operations and Maintenance Responsibility Transfer (OMRT, see 5.3.9 and Figure 5) notification for signature at the Modification Control Board (MCB) post modification review. For temporary minor modifications (TCC and TCM), OMRT notification represents acceptance until the time of removal. The site ICR shall retain a copy of the signed OMRT on site, and send the original to the implementing organization project officer. The distribution of the OMRT for temporary minor modifications is the same as for permanent minor modifications.

5.5 COMPUTER SOFTWARE TRANSITION

5.5.1 Software Development Contractor Activities.

The process of transitioning computer software is intended to maintain rigid control of the Air Force Satellite Control Network system configurations. The computer software transition process is shown in Figure 9.

5.5.1.1 Software Package At the successful conclusion of Step 2 testing, the software development contractor shall prepare the software products for delivery in accordance with contract requirements. Tapes, disks, and other deliverables required in the delivery by individual contracts shall be identified. If incremental delivery is acceptable to the Procuring Activity, each delivery shall be accompanied with its associated documentation. Documentation accompanying the delivery shall include, but is not limited to, the following:

- a. The Version Description Document (VDD)
- b. Compiled documentation of each deficiency and its resolution during prior computer software configuration item (CSCI) compliance tests
- c. Any unresolved deficiencies including the severity of impact
- d. Results of the Functional Configuration Audit and Physical Configuration Audit (FCA and PCA) (if other than sustaining engineering Procuring Activity procured)
- e. Any engineering changes and maintenance fixes implemented and a brief description of each
- f. Restrictions and limitations

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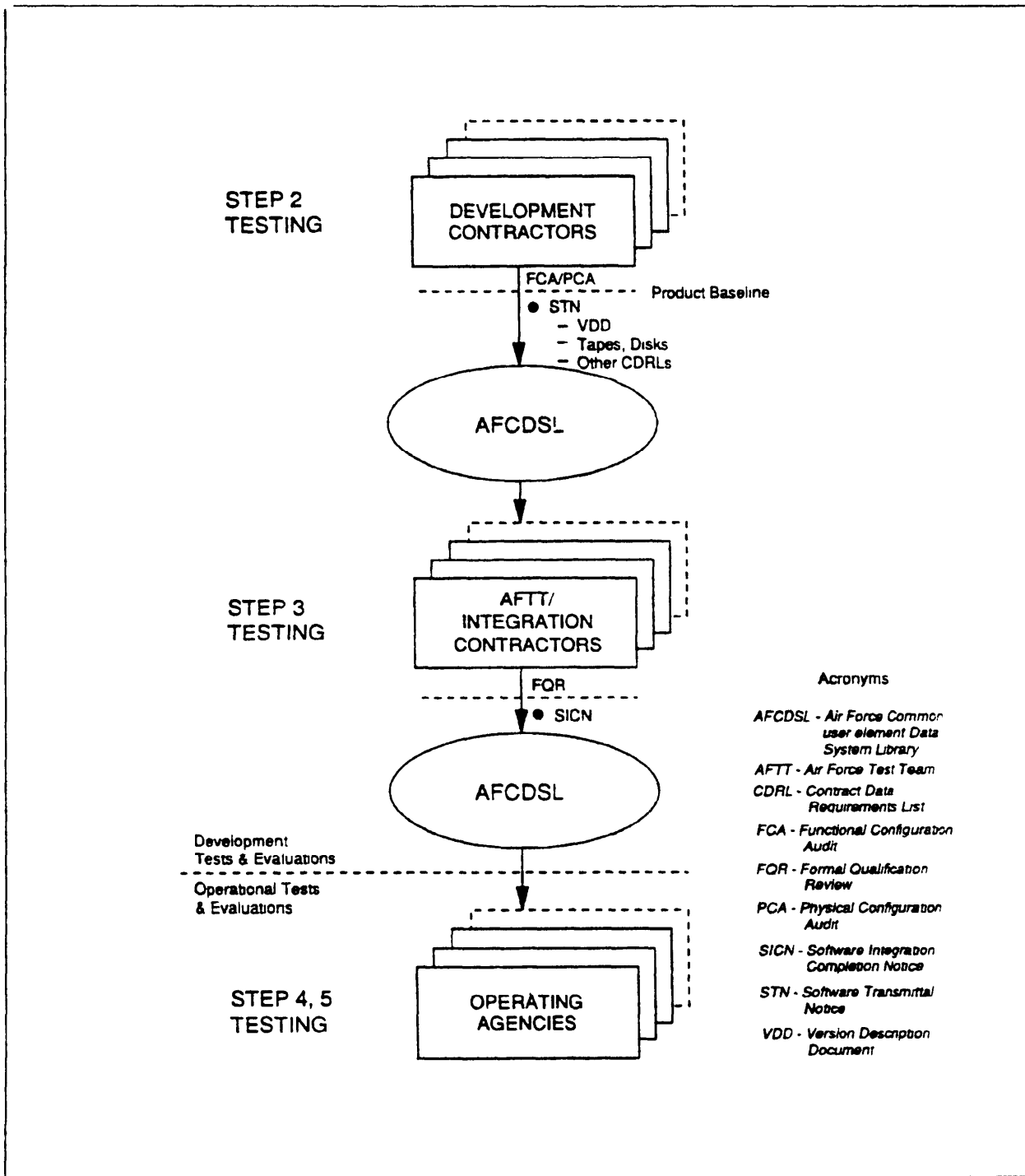


FIGURE 9. COMPUTER SOFTWARE TRANSITION PROCESS

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- g. Operator instruction materials (revised handbooks, users manuals, etc.)
- h. Installation instructions
- i. Updated test plans, procedures, and interface control documents
- j. Test report of computer software configuration item (CSCI) compliance tests, as appropriate, or for the equivalent development tests and evaluations for this Step 2 testing

5.5.1.2 Audits. The Functional Configuration Audit and Physical Configuration Audit (FCA and PCA) are normally conducted in accordance with contract requirements prior to delivery to the Air Force Common-user-element Data System Library (AFCDL) for sustaining engineering (SE) Procuring Activity procured software or modifications. The SE Procuring Activity conducts the FCA and PCA with the software integration contractor representative and the software development contractor agents witnessing. For other than SE Procuring Activity procured software, such as mission unique software for a specific program, the FCA and PCA shall have been conducted with satisfactory results by its procuring activity prior to delivery to the AFCDL. The successful completion of the FCA and PCA results in an established product baseline.

5.5.1.3 Software Transmittal Notice. The software development contractor shall formally notify the Procuring Activity and the integration contractor of each delivery to the Air Force Common-user-element Data System Library (AFCDL) by preparing and forwarding a Software Transmittal Notice (STN). Documentation accompanying deliveries to the AFCDL shall have an STN prepared for each. The AFCDL retains the STN original and forwards a copy to the Procuring Activity with the results of the Functional Configuration Audit and Physical Configuration Audit (FCA and PCA). A sample format of an STN is shown in Figure 10.

5.5.2 Software Integration Contractor Activity.

5.5.2.1 Software Product Baseline The Air Force Common-user-element Data System Library (AFCDL), or the designated integration contractor, shall build the software test configuration with the existing satellite control network software baseline, using the materials delivered by the software development contractor(s). The software development contractor(s) shall assist in building this configuration as

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Date: _____

To: _____

From: _____

Contract No./ECP/AFECP/TCC/TCM: _____

1. The following software is required for this modification:

<u>Item No.</u>	<u>Description</u>	<u>Quantity</u> <u>Required</u>	<u>Drop-</u> <u>Short</u> <u>Ship</u>	<u>Received</u> <u>Initials</u>	<u>Date</u>
-----------------	--------------------	------------------------------------	---	------------------------------------	-------------

2. The following documents are required for this modification:

<u>Item No.</u>	<u>Doc No.</u>	<u>Rev</u>	<u>Description</u> <u>Title</u>	<u>Qty</u> <u>Recvd</u>	<u>Drop-</u> <u>Short</u> <u>Ship</u>	<u>Received</u> <u>Initials</u>	<u>Date</u>
-----------------	----------------	------------	------------------------------------	----------------------------	---	------------------------------------	-------------

3. Additional information attached and forwarded: (test reports, operator instructions, installation instructions, recommendations, restrictions and limitations, summary of resolved and unresolved software deficiency reports, etc.) .

FIGURE 10. SOFTWARE TRANSMITTAL NOTICE
(STN Sample Format)

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required, within the scope of the applicable contract provisions. Step 3 integrated system tests are performed on this test configuration. This software test baseline is a fluid one during this period, continuously changing as each maintenance fix is implemented and delivered in a software test configuration to the AFCDSL. Software maintenance deliveries are treated for possible baseline updates on a case-by-case basis. The integration contractor shall provide recommendations to the Air Force Test Team (AFTT) for rebaselining. The sustaining engineering Procuring Activity or its representative, the AFTT, determines what rebaselining is to be accomplished. All common user software products used in the Step 3, Step 4, and Step 5 tests shall be obtained from the AFCDSL.

5.5.2.2 Software Integration Completion Notification The software integration contractor shall prepare the Software Integration Completion Notification (SICN). The software development contractor and other contractors that supported the Step 3 test shall assist as required in the preparation of the SICN. The materials included in, or referenced in, the SICN shall include, but are not limited to, the following:

- a. A list of all software units, components, CSCIs, and versions in the final build
- b. A list of all software deficiencies with their descriptions, including the new problems encountered during Step 3 tests (see Figure 11).
- c. All user documentation or change pages (i.e. test plans, procedures, handbooks, etc.)
- d. Special loading instructions, restrictions, or limitations
- e. Step 3 test report
- f. Recommendation for its use

The software integration contractor shall submit the SICN to the Air Force Common-user-element Data System Library (AFCDSL) for archive purposes. The AFCDSL distributes SICN copies to the Procuring Activity in accordance with the Air Force Satellite Control sustaining engineering Procuring Activity direction and contract deliverables.

5.5.2.3 Operational Software Build. Upon completion of the Step 3 integrated system tests, the integration contractor shall review and ensure that all unresolved deficiencies are

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SERVICE / DEFICIENCY REPORT				1. DATE/TIME DISCOVERED:	
SECTION 1 - ORIGINATION		2A. S/DR NO:		2B. HAZARD SEVERITY:	
		2C. RECD DATE:		2D. RCH:	
3. TITLE					
4A. ORIG POINT (OFFICE, NAME, PHONE, DATE, SIGN):			4B. SCREENING POINT (OFFICE, NAME, PHONE, DATE, SIGN):		
5. NSR/CPIN/DOC NO:			6. DOC/PROGRAM, TASK, DOC TITLE:		
7. RFR, SHIP, DVHL/PROGRAM AUTHOR/DOC AUTHOR:			8. RFR PART NO/CSCI/VOL NO:		
9. SER/LOT/BATCH NO.		A. RELEASE/REV/CHANGE:		B. UNIT/ADDR/CI:	
10. CONTRACT, PO NO:		11.		12. DATE PRODUCED OR DVHL:	
				13. OPS YRRE AT FAILURE:	
14. GOV'T PURH MAT'L:		15. QTY:	A. NO RCD:	B. NO IRSP:	C. NO DEF:
					D. NO IN STA:
16. DEF ITEM WORKS OR WITH:		17A. FACILITY:	B. BR NO:	C. PROCESSOR:	D. FRAME/TASK NO:
A. END ITEM/SEGMENT:		18. UNDER WARRANTY:		19. DOC VAL:	20. MUC:
B. MMA:		21. EX DISP:			
22. DETAILS: A. CIRC B. DESC C. ACT TAKEN:					
D. T.O. FIGURE AND INDEX:		E. TECH DATA DEF:		DOC NO/PIC INDEX	
				DOC REV:	
F. SUPPORT DATA MAILED:		G. REPORT TYPE:	H. SV/IN ALC CODE:	I. SRO:	J. CNO CODE:
23. VALIDATION POINT (SIGNATURE, DATE):			24. 2ND VALIDATION POINT (SIGNATURE, DATE):		

FIGURE 11. SERVICE/DEFICIENCY REPORT FORM
(S/DR Sample Format, page 1 of 2)

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SECTION 2 - ANALYSIS		25. ACTION POINT:	
26. EXHIBITS REQUIRED:		27. ASSIGNED PROJECT OFFICER:	
28. SUPPORT POINT ONE:		29. SUPPORT POINT TWO:	
30. RESOLUTION PRIORITY: <input type="checkbox"/> CRITICAL <input type="checkbox"/> EMERGENCY <input type="checkbox"/> URGENT <input type="checkbox"/> ROUTINE	31. RECOMMENDED DISPOSITION: <input type="checkbox"/> ENHANCEMENT RIP #: _____ <input type="checkbox"/> DEFICIENCY PROGRAM: _____ <input type="checkbox"/> REJECTED	32. EST COR COST:	
33. REL S/DRs & SITES:			
34. ANALYSIS/CORRECTIVE ACTION SUMMARY:		35. RIP REVIEW BOARD APPROVAL:	
SECTION 3 - IMPLEMENTATION/CORRECTIVE ACTION		36. ACTION STATUS:	
37. ECP/DEF NO:		38. EST IMPLEMENTATION DATE:	
39. CORRECTIVE ACTION DETAILS:		40. CLOSURE APPROVAL DATE:	

FIGURE 11. SERVICE/DEFICIENCY REPORT FORM
(S/DR Sample Format, page 2 of 2)

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properly recorded on deficiency report forms. The Air Force Common-user-element Data System Library (AFCDSL) or the integration contractor shall build the final software configuration for operational use. This build shall include fixes to all resolved deficiencies. The development contractor(s) shall assist, within the scope of the applicable contract provisions, as required in constructing this final software configuration for operational use or test.

5.5.2.4 Formal Qualification Review. Following Step 3 tests, a formal qualification review (FQR) is conducted by the network sustaining engineering Procuring Activity and the Operating Agency, with participation from the development contractors, Air Force Test Team (AFTT), and the designated integration contractor, as required. The FQR is to certify and authenticate that the new or modified groups of configuration items have satisfactorily qualified to the specification requirements. The FQR is conducted after the successful completion of integrated system testing (Step 3), and includes a detailed analytical review and assessment of the following:

- a. Specifications, operator/user documentation and interface control documentation.
- b. Test plans, test procedures and test reports.
- c. Existing and new Service Deficiency Reports (S/DRs) and their scheduled fixes.
- d. Changes to operational data bases and system files.
- e. Special or additional training
- f. An overall assessment and recommendation as to mission operability and suitability

5.5.3 Operating Agency Acceptance. The Operating Agency determines, based upon the results of the formal qualification review, whether or not installation of the new or modified software can be performed by the network sustaining engineering Procuring Activity. The installation shall be coordinated and scheduled with the individual user Modification Control Boards (MCBs).

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5.6 STATUS REPORTING

5.6.1 Status Codes. The modification implementation process includes the reporting of hardware modification status by the site to the applicable satellite control network and contractor organizations. The reporting of modification status is simplified by the use of status codes. The two types of status codes to be used are installation status codes and documentation status codes.

5.6.1.1 Installation Status Codes. The status of site installation and checkout shall be reported using the status codes listed below. For status that does not fit any of these codes, the nearest related code shall be used and explained further in the remarks.

INSTALLATION
STATUS
CODE

COMMENT or REMARK

- | | |
|---|--|
| 1 | Installation package and documentation on-site |
| 2 | Inventory complete. Modification Transmittal Notification (MTN) signed. Installation in progress |
| 3 | Installation Complete. Testing by installer in progress (specify step test in remarks section) |
| 4 | ICCN Signed. Formal testing in progress (specify step test in remarks section) |
| 5 | Mission ready. Operations and Maintenance Responsibility Transfer (OMRT) signed |
| 6 | Modification Technical Acceptance Recommendation (MTAR) letter signed. Status code "6" shall be used when a temporary modification is removed or authorized under a different permanent modification and no longer reported under the temporary number |

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5.6.1.2 Documentation Status Codes A three-letter code shall be used to identify the status of modification documentation. The first letter refers to preventive maintenance instructions (PMIs), the second to technical manuals (TMs), and the third to engineering drawings. The documentation status codes are as follows:

DOCUMENTATION STATUS <u>CODE</u>	<u>COMMENT or REMARK</u>
A	None on site
B	Preliminaries on site
C	Preliminaries validated on this site; awaiting finals or corrected preliminaries (not applicable to minor modifications)
D	Preliminaries not to be validated on this site; awaiting finals or corrected preliminaries (not applicable to minor modifications)
E	Engineering Change Order on site (this code for drawings only)
F	Finals or corrected preliminaries delivered and verification in progress
G	Finals or corrected preliminaries delivered but unsatisfactory
H	Satisfactory finals or corrected preliminaries delivered
I	Not required
J	Final documentation to be delivered by separate Engineering Change Proposal (ECP)

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5.6.2 Reporting Requirements.

5.6.2.1 Integration Contractor Reports. The site integration contractor representative (ICR) shall send weekly installation and checkout status reports to the applicable satellite control network and contractor offices. A complete summary report shall be submitted at the beginning of each month. The monthly status reports shall include all modifications and the weekly updates shall identify additions or changes to the monthly report. The status and update reports for each Engineering Change Proposal (ECP) shall list all applicable Integration Deficiency Reports (IDRs), the IDR type, the date opened, and the date closed, if appropriate. An item shall be added to the status report when the modification package arrives on site and shall be reported until status code "6" is reached. The date on which status codes change shall be annotated in a separate column. The weekly reports shall be coordinated with the Modification Control Board chairperson, the site O&M manager, and the logistics support organization on site.

5.6.2.2 Use of Status Codes. The status codes shall not be used for reporting problems. Delays or problems with a modification or documentation shall be reported in the remarks portion of the status report. Modification Integration Deficiency Reports (IDRs) shall be listed in the appropriate remarks column.

When the documentation changes resulting from a modification are to be accomplished by a separate Engineering Change Proposal (ECP), the modification ECP shall carry the appropriate installation status code, "1" through "6", and a documentation status code of "J". The specific status of the associated documentation ECP shall be reported separately.

Documentation Engineering Change Proposals (ECPS) shall carry the installation status code "1" and the appropriate documentation status code, "A" through "H", until the Modification Technical Acceptance Recommendation (MTAR) is signed. After the MTAR is signed, the documentation ECP shall carry the installation status code "6".

All temporary modifications shall carry the appropriate installation status code, "1" through "5", during their effective period. Installation status code "6" shall be used when the temporary modification has been removed or replaced by a permanent modification and shall no longer be reported.

For minor modifications, some parts required for installation may be provided separately from the modification kit. When modification kits and their documentation are on site, but all

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required parts are not, the installation status code of "1" shall be used and "AWP" (awaiting parts) shall be entered in the remarks column.

If operational tests and evaluations (OT&E) are in progress after Operations and Maintenance Responsibility Transfer (OMRT), but before the Modification Technical Acceptance Recommendation (MTAR) letter is signed, "OT&E in progress" shall be added to the remarks section.

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SECTION 6

NOTES

This Notes section is not a mandatory part of this handbook. The contents of this section are intended for use by government acquisition personnel for guidance and information only.

6.1 INTENDED USE

This handbook is intended for use in acquisition contracts for selected ground equipment and associated computer software. The handbook expands on MIL-STD-1833 (USAF), using implementation in the Air Force Satellite Control Network (AFSCN) as an example. The handbook documents what must be done with modifications or upgrades of existing ground equipment and associated computer software resources to achieve an operational status. The handbook provides an outline of the required steps and who is responsible for doing them, focusing primarily on the different contractor tasks. The material presented is based on practices used within the AFSCN. For example, new computer software developments are usually based on DOD-STD-2167 requirements; however, existing computer software developments may have been based on other requirement documents, such as MIL-STD-483. The procedures presented are intended to accommodate new computer software developments that are based on either MIL-STD-483 or DOD-STD-2167 requirements being integrated into existing computer software that was developed using either MIL-STD-483 or DOD-STD-2167 requirements.

The handbook should be cited in the contract Statement of Work or other requirement documents, to specify the applicable tasks and requirements for the acquisition of ground equipment and associated computer software. Note that this handbook would not normally be used in the acquisition of space equipment.

6.2 GUIDANCE DOCUMENT REFERENCES

The following documents may provide additional related information:

SPECIFICATIONS and STANDARDS:

MIL-STD-483	Configuration Management Practices for Systems, Equipment, Munitions, and Computer Programs
MIL-STD-1521	Technical Reviews and Audits for Systems, Equipments, and Computer Software

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MIL-STD-1833 (USAF) Test Requirements for Ground Equipment and
Associated Computer Software Supporting
Space Vehicles

DOD-STD-2167 Defense System Software Development

REGULATIONS:

AFR 12-50 Disposition of Air Force Documents
AFR 14-1 Configuration Management
AFR 55-43 Management of Operational Test and
Evaluation
AFR 57-4 Modification Approval and Management
AFR 66-1 Communications-Electronics Maintenance
Program Policies and Procedures
AFR 80-14 Test and Evaluation
AFR 800-4 Transfer of Program Management
Responsibility
AFR 800-14 Life Cycle Management of Computer
Resources in Systems
AFR 800-19 System or Equipment Turnover
AFSCR/AFLCR 800-33 The Service/Deficiency Reporting System
AFSC/SD 80-14, Research and Development Test
sup 1 and Evaluation
TO-0035D-54 USAF Material Deficiency Reporting and
Investigating System

6.3 RECORDS MAINTENANCE

Records accumulated as a result of the documentation requirements identified in this document are to be maintained in accordance with AFR 12-50, Disposition of Air Force Documentation. During testing, records accumulated as a result of contractual requirements are to be maintained in accordance with the provisions of the applicable contract.

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6.4 MANAGEMENT OF OPERATIONAL TESTS AND EVALUATIONS.

The Air Force Operational Test and Evaluation Center, AFOTEC, manages Air Force operational tests and evaluations (OT&E) as directed or designated in one of its three levels of involvement:

- a. Conducts OT&E
- b. Monitors OT&E
- c. Provides advisory role in the conduct of OT&E

6.5 TAILORED APPLICATION

The technical requirements in each contract should be tailored to the needs of that particular acquisition. Military handbooks, specifications, and standards need not be applied in their entirety. Only the minimum requirements needed to provide the basis for achieving the program requirements should be imposed. The cost of imposing each requirement of this handbook should be evaluated by the program office against the benefits that should be realized. However, the risks and potential costs of not imposing requirements must also be considered.

The extent of testing required is to assure a satisfactory design and implementation prior to operational use. This is especially crucial in software testing because of its rapidly evolving technology. If adherence to this handbook is by selective application or tailoring, the fundamental purpose of development tests and evaluations and of operational tests and evaluations should be properly observed.

6.6 SUBJECT TERM (KEY WORD) LISTING

Acceptance
Checkout
Development
Hardware
Inspections
Installation
Maintenance
Mission Ready
Modification
Network
Operational
Qualification
Records
Responsibility Transfer

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6.6 SUBJECT TERM(KEY WORD) LISTING (continued)

Satellite
Software
Status
Test Plan
Test Procedure
Test Requirements
Test Step
Test Team
Testing
Turnover

Custodians
Air Force - 19

Preparing Activity
Air Force - 19

(Project No. 1810-F043)
Document 2169b Arch 1372b

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL*(See Instructions - Reverse Side)*

1. DOCUMENT NUMBER MIL-HDBK-348 (USAF)	2. DOCUMENT TITLE SATELLITE CONTROL NETWORK HARDWARE AND SOFTWARE OPERATIONAL ACCEPTANCE PROCESS
--	---

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION (Mark one) <input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify): _____
b. ADDRESS (Street, City, State, ZIP Code)	

5. PROBLEM AREAS

a. Paragraph Number and Wording.

b. Recommended Wording

c. Reason/Rationale for Recommendation

6. REMARKS

7a. NAME OF SUBMITTER (Last, First, MI) - Optional	b. WORK TELEPHONE NUMBER (Include Area Code) - Optional
---	--

c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional	8. DATE OF SUBMISSION (YYMMDD)
--	---------------------------------------

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NOTE: This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

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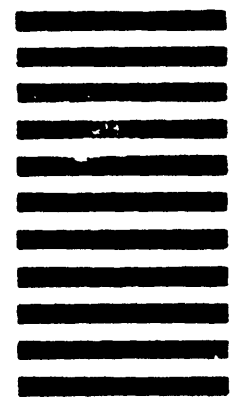
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